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DIVERGENT THINKING ABILITIES—A VALIDATION STUDY

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SUMMARY. Verbal reasoning and semantic divergent thinking scores together with assessments of conventional and creative English attainment were gained for 331 10-year-old children. A factor analysis demonstrated a separation of the ability and attainment measures. A zonal analysis showed that highly divergent children gained better scores on the creative attainment criterion than did highly convergent children. The threshold hypothesis was tested by relating convergent and divergent thinking at different levels of VRQ, and was rejected. Evidence concerning construct and academic validity is discussed.

INTRODUCTION

Guilford and Hoepfner (1971) distinguish two types of validity in relation to semantic divergent thinking abilities, construct validity, which involves the use of a creative criterion, and academic validity, which relates to conventional achievement measures.

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Tests of divergent thinking have tended to become synonymous with tests of creativity in the research literature. However, Nuttall (1972) points out that for every ten studies which have used the tests and accepted their validity, only one attempted an empirical validation against creative criteria, and few met with any success. McNemar (1964) and Cronbach (1970) have also criticised the lack of evidence about validity, the former stating that " there is no evidence whatsoever that the tests have predicted value for non-test real-life creative performance." In his review of this area Shapiro (1968) claimed that the basic problem is the lack of objective criteria. " Without establishing objective criteria, all endeavours at devising predictors, investigating personality and cognitive characteristics . . . are of questionable value."

Studies which have attempted to validate these tests in the field of education have often used teacher or peer ratings of pupil creativity, a criterion which Wallach and Kogan (1965) claim is ' next to worthless ' because of subjectivity and halo effect. Merrifield, Guilford and Gershon (1963) found correlations between —0·04 and 0·42 between teacher ratings and divergent abilities at sixth grade level, and Haddon and Lytton (1971) report a correlation of 0·29 at secondary level. Lovell and Shields (1967), Moss and Duenck (1967) and Dewing (1970) all report low relationships.

Convincing construct validity would therefore appear to be lacking, due mainly to the dearth of objective criteria. It could be argued that current emphasis on creative activity in primary education provides a criterion which is worthy of consideration in this context, namely creative, or imaginative, story writing. Guilford (1959) has suggested that the abilities required for successful writing are those constituting the semantic divergent block of his ' structure of intellect ' model. Only Rudd (1970) appears to have published a study which investigated this relationship using Guilford's tests. These were related to tests of written expression, involving the use of imagination, in a sample of 113 CSE candidates. A factor was identified with moderate to high loadings from both sets of measures. Unfortunately, the correlation matrix was not published.

Research concerning academic validity has been equivocal on both sides of the Atlantic. In Britain Hasan and Butcher (1966) reported correlations of 0·62 with English, and 0·76 with arithmetic, but Richards and Bolton (1971) concluded that divergent abilities played only a minor role in mathematics attainment. In the United States divergent abilities have been related to attainment in science (Cline, Richards and Needham, 1963), mathematics (Petersen, Guilford and Hoepfner, 1963) and to general achievement batteries (Ohnmacht, 1966), but results have again been conflicting.

A number of factors have been put forward to explain this conflict, the one receiving most attention being the relationship between convergent and divergent abilities. Getzels and Jackson (1962) and Wallach and Kogan (1965) claimed that creativity (divergent thinking) and intelligence could be considered separate modes of intellectual functioning. Their samples were highly atypical however, and it has since been found that correlations between these abilities tend to be higher among samples more representative of the whole ability range. The moderately high correlations reported by Hasan and Butcher (1966) and Haddon and Lytton (1968) lend support to this.

It has also been found that different relationships exist at different levels of VRQ. Guilford and Hoepfner (1966a) found that those who score low on divergent tests can range widely on VRQ, but those who score highly on divergent tests also score highly on VRQ. This is implicit in the threshold hypothesis (McKinnon, 1962) which postulates that a minimum level of intellectual ability is necessary for a high level of divergent ability, but above a certain level, commonly held to be VRQ 115+, little relationship exists between divergent ability and VRQ. Studies which have investigated this have again been equivocal (Haddon and Lytton, 1968; Lytton and Cotton, 1969; Cicirelli, 1965).

The present study attempts to clarify a number of the problems outlined above by the examining of the relationships between—

(1) Semantic divergent thinking abilities and assessments of imaginative stories, to gain evidence of construct validity.

(2) Divergent abilities and conventional English attainment to gain evidence concerning academic validity.

(3) Divergent and convergent (VRQ) abilities, to assess the unitary nature of divergent thinking abilities.

(4) Divergent and convergent abilities at different levels of VRQ to assess the threshold hypothesis.

METHOD

The sample consisted of 331 children (164 boys and 167 girls) of mean age 10 years 3 months, drawn from 11 classes in eight schools. The geographical distribution of these schools ensured that the sample was representative in terms of social class and intelligence levels. The mean VRQ was 104·8, standard deviation 17·0. The following measures were obtained.

Attainment.

(1) Rank orders in formal English obtained from end of term tests. These were scaled against the verbal reasoning test to allow comparison across classes (Yates and Pidgeon, 1957).

(2) Assessments of imaginative stories. Two teachers, not involved in the study, gave impression marks for the use of imagination, good ideas and so

on, ensuring that poor spelling and grammar were not penalised. The score allotted was the sum of two seven-point ratings. Mark/re-mark and inter marker correlations both exceeded 0·70.

Abilities.

(3) Convergent. Verbal Reasoning Test. (Primary Verbal 3. NFER).

(4) Divergent. 10 tests of semantic divergent thinking abilities taken from Guilford and Hoepfner (1966b). To increase reliability two tests were given for each of the following abilities—ideational fluency, spontaneous flexibility, associational fluency, originality and expressional fluency. A word count of the story provided an additional measure of word fluency. Each ability score was the average of the two test scores after each had been standardised by conversion to T scores. A composite score of semantic divergence was also computed, this being the average of the five ability scores.

RESULTS

Table 1 presents the correlation matrix separately for each sex. The correlations among the tests of divergent ability range from 0·36 to 0·74, which are somewhat higher than their correlation with verbal reasoning, which range from 0·26 to 0·50. The composite score of semantic divergence correlated with verbal reasoning 0·54 and 0·58 among boys and girls, respectively. These are similar to the values obtained by Haddon and Lytton (1968), but lower than those gained by Hasan and Butcher (1966).

TABLE 1

INTERCORRELATIONS OF ABILITY AND ATTAINMENT MEASURES, BY SEX.

	1	2	3	4	5	6	7	8	9	10
1. Imaginative story (fluency)		62	42	46	29	36	36	47	38	49
2. Imaginative story (mark)	56		49	57	35	45	40	52	37	55
3. Verbal reasoning	41	50		87	26	44	35	44	42	54
4. English	45	51	90		24	46	37	49	39	55
5. Ideational fluency	25	27	31	30		74	57	39	51	79
6. Spontaneous flexibility	23	32	47	41	72		56	45	53	80
7. Associational fluency	30	40	32	33	53	42		51	43	75
8. Originality	35	47	41	41	48	49	40		45	71
9. Expressional fluency	38	38	50	50	36	43	45	40		74
10. Semantic divergence	43	53	58	57	80	80	72	73	70	

Girls above diagonal (N=167); boys below diagonal (N=164).
Significance levels: 0·15< ·05, 0·20=P< ·01, 0·28=P< ·001.

The intercorrelations of individual divergent abilities and the imaginative story, although highly significant, were no larger than their correlation with the conventional English score. In fact, semantic divergence correlated slightly more highly with English than with the creative criterion. The difference between convergent ability and the two criterion measures is more marked. Verbal reasoning correlated nearly 0·90 with English, but 0·50 with the story, although the former relationship could have been artificially increased by the scaling procedure.

To clarify the relationship factor analyses were computed separately for each sex. Since these were almost identical the factor structure for the whole sample is reported. Three factors with eigen values in excess of unity emerged, accounting for some 72 per cent of the variance. The analysis, after a varimax rotation to simple structure, is presented in Table 2. Factor one clearly indicates convergent ability and conventional attainment. Factor two delineated the semantic divergent abilities with a maximum loading on ideational fluency. The variance of the tests of originality and expressional fluency is spread to other factors, the former to factor three and the latter to factor one. Factor three isolates the imaginative story, on which three divergent abilities have low to moderate loadings. The high loading of the story fluency measure indicates that longer stories tended to gain higher marks.

TABLE 2

FACTOR LOADINGS AFTER VARIMAX ROTATION.

	1	2	3
1. Imaginative story (fluency)			84
2. Imaginative story (marks)	31		77
3. Verbal reasoning	91		
4. English	90		
5. Ideational fluency		90	
6. Spontaneous flexibility		82	
7. Associational fluency		70	30
8. Originality		51	47
9. Expressional fluency	39	52	28
Rotated percentage variance	29·1	25·5	17·7

Decimal points and loadings less than ·30 have been omitted except where the values are useful for comparison.

Convergent and divergent abilities.

The relative contribution of the two ability measures to the two attainment measures can be assessed by a zonal analysis. Scores on the verbal reasoning test and the composite measure of semantic divergence were divided into high, average, and low groups by splitting the distributions at half a standard deviation above and below the mean. This results in nine cells. For each cell the mean scores on the story and the conventional English measure were computed. These are shown in Table 3.

TABLE 3

MEAN SCORES ON CONVENTIONAL AND CREATIVE ATTAINMENT AT DIFFERENT LEVELS OF DIVERGENT AND CONVERGENT ABILITY.

CONVENTIONAL ATTAINMENT IMAGINATIVE STORY

	Semantic Divergence				Semantic Divergence			
	High	Mid	Low	All	High	Mid	Low	All
High V.R. (113+)	56·4 (61)	49·6 (34)	46·7 (10)	53·3 (105)	10·3	6·6	6·1	8·7
Mid V.R. (97—112)	36·8 (38)	34·3 (42)	31·2 (32)	34·3 (112)	7·7	7·1	5·7	6·9
Low V.R. (96—)	26·9 (11)	22·1 (42)	15·4 (61)	19·0 (114)	7·9	5·7	3·7	4·8
All	46·7 (110)	34·4 (118)	23·3 (103)	35·0 (331)	9·2	6·5	4·6	6·8

The numbers in each cell are shown in parentheses.

Not surprisingly those children who gained high scores in both ability measures excelled in both criterion measures, although children with high divergent ability tended to gain higher scores on the story than did those with high convergent ability. Also of interest is the fact that children who gain high divergent scores, but average or low convergent scores, gained significantly higher marks than those with high convergent, but low or average divergent scores. Both these relationships are clearly reversed when the conventional English measure is considered.

The number of children appearing in each cell is also shown in Table·3. If Guilford's premise concerning the relationship of convergent and divergent abilities is correct, then the numbers in the three low divergent cells should be randomly distributed. In the high divergent cells a significantly greater number should appear in the high convergent/high divergent cell, and least in the high divergent/low convergent cell. Only the latter part of the premise is borne out by the results. 61 children were classified high on both ability measures, reducing to 11 children classified high divergent/low convergent. This same pattern is evident in the low divergent column but in reverse order. In brief, a high level of convergent thinking ability is associated with a high level of divergent thinking, and *vice versa*.

To test the threshold hypothesis the sample was grouped by VRQ level and by sex. The correlation of each group with semantic divergence is shown in Table 4.

TABLE 4

CORRELATIONS BETWEEN VRQ AND SEMANTIC DIVERGENCE BY LEVEL OF VRQ AND SEX.

Girls	VRQ Range	N	r	Boys	VRQ Range	N	r
High V.R.	115+	53	·38	High V.R.	113+	52	·26
Av. V.R. ..	99–114	59	·31	Av. V.R...	96–112	58	·03
Low V.R...	98–	55	·39	Low V.R.	95–	54	·49

Although a sex difference exists in the average levels of VRQ, the general picture is clear. Although the correlations at lower levels of VRQ tend to be slightly larger, there is no evidence of a threshold effect operating.

DISCUSSION

Hasan and Butcher argued that the intercorrelations of individual divergent thinking abilities are often of similar magnitude to their correlations with verbal reasoning. Implicit in this view is that the likelihood of separation in a factor analysis is remote. The present study does not confirm this and Guilford (1968) has, in fact, pointed out a fallacy in this line of argument. He maintains that it is invalid to contrast correlations between individual divergent abilities and a verbal reasoning score. Since the latter is composite of several subtests of convergent thinking, any individual ability measure is likely to correlate more highly with it because composite measures are able to share more sources of variance.

Guilford's premise concerning the relationship of convergent and divergent thinking was only partially supported. The cell populations in Table 3 make it clear that the relationship is consistent and fairly close at each ability level. Only 3 per cent of the sample combined low convergent scores with evidence of high divergence, and a similar percentage combine low divergence with high convergence. In contrast 18 per cent of the sample gained high scores on both ability measures, a category ignored by Getzels and Jackson. The threshold hypothesis was also contradicted. Although the correlations between the two ability measures were slightly higher at lower level of VRQ, correlations of between 0·26 and 0·38 were apparent at high levels of VRQ. It could, of course, be argued that the correlation would be lower at levels of VRQ higher than those adopted in this study.

The factor analysis demonstrated a separation of divergent abilities, convergent abilities/conventional attainment, and creative attainment. Ideational fluency, spontaneous flexibility and associational fluency loaded most strongly on the divergent thinking factor, but the variance of the tests of originality and expressional fluency spreads to other factors. Originality loaded moderately on the imaginative story factor, reflecting no doubt the emphasis teachers place on this ability in their impression marking. This seems to indicate an overlap between originality as measured by objective tests and teacher ratings of creative attainment. Expressional fluency loaded moderately on the conventional attainment factor. The tests for this ability consist of constructing sentences in which specified words must appear. It is reasonable to assume that verbal proficiency plays a larger part in this type of test.

Evidence for construct validity is provided by the fact that three semantic divergent abilities load on the story factor. The zonal analysis added further evidence by showing that highly divergent children score better marks on average than highly convergent children. The performance of those children with high divergent scores but moderate or low levels of convergent ability also lends support to the premise that divergent abilities contribute more to such attainment than do convergent abilities. There appears less evidence of academic validity. The correlations between divergent abilities and conventional English were all significant, ranging from ·3 to ·5, but only one loaded on the conventional attainment factor.

Although the results help to clarify some of the relationships outlined in the introduction, no complete answers are possible. The evidence concerning the construct validity of semantic divergent abilities is encouraging, but it does not provide any justification for treating such abilities as synonymous with creativity.

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SOME PERSONALITY CORRELATES OF INTELLIGENCE AND EDUCATIONAL ATTAINMENT IN IRAN

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SUMMARY. The Persian form of the EPI and Eysenck's Psychoticism Scale were administered to a large group (about 23,000) of Iranian secondary school graduates, aged between 18 and 19, taking the Pahlavi University entrance examination. The latter consisted of a Persian adaptation of the Otis (Advanced Level) and five multiple choice tests of academic attainment. Analysis of results for two randomly selected groups of boys and one group of girls revealed a consistently negative correlation between measures of cognitive performance and psychoticism. A somewhat less consistent but positive correlation was observed for the extraversion scale. There was little correlation between neuroticism and measures of intelligence or achievement.

Considering the joint effects of extraversion and psychoticism, stable extravert subjects seemed to have performed best on tests of ability and attainment. Psychotic introverted girls, however, seem to be superior to their extraverted counterparts. This sex difference persists with regard to a number of other dependent variables.

On the whole, the personality patterns of more intelligent and academically successful Iranian students would appear to be more like those of younger British pupils (below 15 years) than their own age-mates. The superior correlation between the psychoticism scale and measures of cognitive efficiency indicates the need for further exploration of this dimension as a potentially important aspect of normal personality.

INTRODUCTION

Over the past 15 years, a large number of studies have investigated the relationship between performance on traditional measures of intelligence and academic achievement and the basic personality dimensions of extraversion (E) and neuroticism (N) as described by Eysenck. On the basis of Eysenck's (1957, 1967) theory linking extraversion with reactive inhibition and neuroticism with arousal, introverted subjects with a moderate level of neuroticism are expected to obtain higher scores on tests of ability or attainment. While this prediction has been confirmed by some of the early studies (e.g., Furneaux, 1962; Lynn and Gordon, 1961), later work has revealed a more complicated picture.

Reviewing the early literature, Warburton (1969) has noted that up to the age of 15 anxiety or neuroticism is never an advantage, but at later ages it is so in 24 out of 34 cases. Similarly, before the age of 15 the introversion factors are an advantage in only 13 per cent of the cases, but after 15 the figure rises to 96 per cent. This variation with age has been confirmed by many of the later studies (Entwistle and Cunningham, 1968; Eysenck and Cookson, 1969; Entwistle and Welsh, 1969; Finlayson, 1970). These studies have indicated further complicating factors, e.g., sex (Entwistle and Cunningham, 1968), field of study (Wilson, 1971), study attitudes and habits (Entwistle and Entwistle, 1970; Cowell and Entwistle, 1971), and level of ability (Entwistle and Welsh, 1969).

On the whole, the bulk of evidence indicates that at the grammar school and the university level students with superior ability and attainment tend to be introverted, but they may be stable or neurotic depending on other, as yet unspecified, factors. Kline (1966) has reported a similar pattern for Ghanaian students.

This paper presents data obtained with three groups of Iranian university applicants. The findings may be of interest to Western workers not only because of their cross-cultural value but also because they present a totally opposite view of the superior student as far as the extraversion dimension is concerned. The study also offers evidence that Eysenck's newly developed psychoticism scale may be a better predictor of academic and intellectual performance.

METHOD

Subjects were 707 male and 171 female secondary school graduates taking the annual entrance examination of Pahlavi University in Southern Iran. They represent a random sample of a much larger applicant population (about 23,000) coming from all over the country The majority of subjects were aged between 18 and 19 years and were Persian-speaking Muslims. Their eligibility to take the entrance examination meant that they had all successfully completed 12 years of highly formal and standardised schooling. During the first nine years, all students follow the same centrally determined curriculum. From the 10th grade on, students follow one of the three branches of specialisation : mathematics (or physical sciences), natural sciences (or biology), and literature (or humanities). The choice of a field of specialisation depends on students' future course of study as well as his past performance. On the whole, the more intelligent and serious students tend to choose the two science branches (Mehryar and Shapurian, 1970).

The original sample included all three branches of specialisation. Because of the small number of boys and girls coming from the literary branch and similarly small number of girls from the mathematics branch, this report will deal with boys and girls coming from the natural science branch and boys coming from the mathematics branch. Because of differences in a number of dependent variables between the two groups of specialisation as well as boys and girls within the same area, the three groups will be treated separately.

The test battery used for selection purposes included the following instruments :

(1) A general battery of aptitude tests consisting of a Persian adaptation of the Otis-Lennon Mental Ability Test (Advanced Level) and two tests of proficiency in English and Persian languages taken by all applicants regardless of their field of specialisation.

(2) Three multiple-choice tests of attainment in the main subject areas regarded as important for success at the university level. These varied according to subjects' field of specialisation at the secondary school. For the mathematics group, they included physics and mechanics, chemistry and mathematics. For the natural science groups, they consisted of physics and mathematics, chemistry and biology. The above tests were given under strict examination conditions with predetermined time limits. At the end of the session, subjects were asked to fill a questionnaire consisting of the following :

(3) A slightly modified version of the Persian form of the Eysenck Personality Inventory (Mehryar, 1970). The modification consisted of the addition of one item each to the original Extraversion and Neuroticism scales and the inclusion of the Persian adaptation of Eysenck's (1968) psychoticism scale.

(4) A personal data sheet asking for, among other things, such background information as fathers' education, subjects' past academic performance, and their self-ratings of parental relations, financial standing of the family, as well as their own academic standing in comparison with their classmates. For the latter purposes, a five-step rating scale running from 5 (very good) through 3 (average) to 1 (very bad) was employed.

The research nature of this part of the examination was amply emphasised and subjects were assured that their responses would be treated confidentially and not taken into account for selection purposes.

RESULTS

A correlational analysis of the data revealed small but consistently positive correlations between measures of intelligence and extraversion. The values of r varied from ·11 to ·14 and were significant in two out of three cases. Similarly, psychoticism correlated significantly negatively with measured intelligence in all three groups, values of r varying from —·16 to —·19. None of the correlations between neuroticism and intelligence, however, was significant. The EPI Lie scale also correlated negatively with intelligence, two of the correlations (—·13 and —·16) being statistically significant.

Of the 15 correlations between extraversion and the five measures of attainment, only two were significant. Both of these correlations, however, were negative (—·15 and —·16) and belonged to the female group. Of those between neuroticism and attainment, only one was significant (r= —0·12). In contrast, six out of the 15 correlations produced by the psychoticism scale were statistically significant. These correlations varied from —·10 to —·20. Again, the EPI Lie scale correlated significantly with measures of achievement in three out of the 15 cases. All of these correlations were negative and ranged from —·11 to —·19.

In view of the above findings, psychoticism was chosen as the independent variable for further analysis of the data. Each group was divided into two subgroups in terms of psychoticism : low p or stable (p=4 or less) and high p or psychotic (p=5 or more). Each of these groups were further divided into two groups with reference to extraversion thus resulting in a four-fold classification : stable extravert (p –E+), stable introvert (p –E –), psychotic extravert (p+E+), and psychotic introvert (p+E –). (The term *psychotic* is used to indicate *subjects'* scoring above a particular level on the *psychoticism* scale. It should not be confused with the psychiatric definition of the label ' psychotic.') In both cases, the cut-off points were so chosen that the resulting subgroups would be of more or less equal size. Due to the uneven distribution of scores, however, this condition was only partially met.

Table 1 gives the means and standard deviations (in parentheses) of the six measures of intelligence and achievement for the four subgroups of natural science boys, natural science girls, and mathematics boys, formed in terms of psychoticism and extraversion.

To give an indication of the respective personality patterns of the four subgroups, their EPI results are summarised in Table 2.

TABLE 1

MEANS (AND STANDARD DEVIATIONS) ON TESTS OF ABILITY AND ATTAINMENT.

	STABLE				PSYCHOTIC			
	Extravert		Introvert		Extravert		Introvert	
Test	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Mathematics—Boys								
Otis-Lennon.....	43·12	(10·46)	40·59	(8·88)	39·77	(10·60)	37·16	(9·66)
English	28·34	(14·79)	27·30	(15·07)	22·78	(13·37)	20·86	(14·32)
Persian	19·31	(8·36)	19·93	(10·12)	18·37	(11·50)	17·17	(10·29)
Physics	3·94	(3·60)	4·36	(3·10)	3·49	(3·35)	3·12	(3·28)
Chemistry	16·22	(8·86)	17·55	(8·65)	13·85	(8·21)	13·74	(8·42)
Mathematics	15·41	(9·92)	14·05	(6·87)	12·56	(8·86)	12·26	(8·18)
N	99		85		118		82	
Natural Science—Boys								
Otis-Lennon.....	34·42	(9·77)	34·19	(10·63)	32·12	(9·95)	29·87	(9·26)
English	13·55	(12·63)	13·49	(13·44)	12·33	(12·77)	10·08	(9·67)
Persian	16·01	(8·66)	15·82	(8·88)	14·82	(8·94)	14·45	(9·54)
Physics–Maths...	6·25	(4·59)	6·19	(4·88)	6·34	(4·68)	6·77	(5·02)
Chemistry	13·03	(8·17)	14·19	(8·50)	12·52	(7·41)	12·28	(8·16)
Biology	30·83	(13·09)	31·17	(13·63)	31·39	(10·72)	31·91	(10·77)
N	76		72		98		77	
Natural Science—Girls								
Otis-Lennon	33·24	(9·88)	30·59	(7·46)	29·12	(10·46)	28·46	(8·62)
English	15·52	(14·13)	14·03	(10·44)	10·94	(12·50)	12·51	(11·62)
Persian	17·02	(8·21)	18·73	(8·69)	13·35	(10·26)	13·38	(8·45)
Physics–Maths...	5·90	(3·73)	6·39	(4·22)	5·18	(3·99)	5·41	(4·50)
Chemistry	13·31	(6·00)	12·45	(7·34)	10·91	(5·66)	11·97	(7·33)
Biology	31·38	(10·14)	32·32	(12·29)	27·09	(10·99)	28·38	(12·81)
N	42		56		34		39	

From Table 1, it would appear that in all three groups, low p or stable subjects have done better than their high p, psychotic unstable, counterparts. This is so in 16 out of 18 cases. Although only a few of the differences are large enough to be statistically significant, the overall trend is highly significant ($\chi^2=10{\cdot}88$, $P<{\cdot}001$). Within the stable groups, however, there is little evidence of any difference between the extraverted and the introverted subgroups. On the other hand, psychotic extraverted boys have done better than psychotic introverted boys in 10 out of 12 comparisons ($\chi^2=5{\cdot}33$, $p<{\cdot}05$). Conversely, psychotic introverted girls have achieved higher means than their extraverted counterparts on five of the six variables. Thus, although the difference is not statistically significant, sex would seem to act as a kind of moderating variable among psychotic subjects.

Two other differences emerge from Table 1 which are worth noting. First, on the three common measures of intelligence, English and Persian, the mathematics boys have scored substantially higher than boys and girls coming from the natural science branch. Indeed, the least intelligent groups of mathematics boys, i.e., those characterised as psychotic introvert, have scored higher than the most intelligent group of natural science boys and girls. This is well in line with previous findings by Mehryar and Shapurian (1970). Secondly although natural science boys have consistently scored higher than natural science girls on the intelligence scale, a finding supported by many earlier studies in Iran (Mehryar, Shapurian and Bassiri, 1972), the five achievement measures reveal a much more complicated picture of sex differences. Stable girls have scored higher than stable boys in eight of 10 cases whereas unstable boys have scored higher than their female counterparts in nine out of 10 cases. This observation may lend further support to the earlier suggested function of sex as a moderating variable.

TABLE 2

MEANS (AND STANDARD DEVIATIONS) ON EPI AND PSYCHOTICISM SCALE.

Variable	STABLE				PSYCHOTIC			
	Extraverted		Introverted		Extraverted		Introverted	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Mathematics—Boys								
Extraversion	13·73	(2·50)	8·02	(1·81)	14·02	(2·82)	8·04	(1·73)
Neuroticism	8·90	(4·43)	8·73	(4·28)	13·15	(4·41)	12·47	(4·08)
Psychoticism ..	2·91	(0·92)	2·89	(1·01)	6·63	(1·80)	6·63	(1·78)
Lie Scale ..	5·05	(2·18)	5·43	(1·84)	4·42	(1·97)	5·02	(1·77)
N	99		85		118		82	
Natural Science—Boys								
Extraversion	13·50	(1·94)	7·86	(2·12)	13·44	(2·28)	7·91	(1·87)
Neuroticism	9·55	(4·07)	8·83	(3·91)	13·04	(4·32)	12·67	(4·80)
Psychoticism ..	2·95	(0·93)	2·97	(0·91)	7·10	(2·04)	7·06	(1·84)
Lie-Scale	5·37	(1·92)	5·18	(1·96)	4·83	(1·92)	4·97	(1·67)
N	76		72		98		77	
Natural Science—Girls								
Extraversion ..	13·50	(2·37)	7·68	(2·29)	13·20	(2·31)	7·56	(2·61)
Neuroticism	9·95	(4·38)	11·20	(4·66)	13·23	(3·28)	14·64	(4·07)
Psychoticism ..	2·86	(1·08)	2·78	(1·01)	6·29	(1·95)	7·28	(2·12)
Lie Scale	5·21	(1·82)	5·28	(1·45)	4·50	(2·19)	4·46	(1·57)
N	42		56		34		39	

Data presented so far come from tests given under the particular conditions of the entrance examination. In order to explore the relationship between personality and intellectual functioning under normal school conditions and over a longer time, use was made of the frequency of failure and partial failure in the past as reported by subjects. Failure, in the Iranian educational system, implies an overall below standard grade point average which necessitates the repetition of a whole year or grade. Partial failure, on the other hand, indicates below standard marks on one or several subjects by an individual whose overall grade point average is above the acceptable minimum. Such individuals are required to re-sit their weak subjects at the end of the Summer vacation and, if successful, can proceed to a higher grade. Because of this 'second chance,' partial failure is more common than complete failure. There is also some evidence that partial failure may be a better predictor of future academic performance.

Table 3 presents the mean frequency of partial and complete failure of the sample, separately for the four personality groupings. Also included in Table 3 are means of subjects' self-rated academic standing in comparison with their classmates and their perceived chances of success in the immediately preceding entrance examination. These two scores are in effect measures of subjects' self-concept and level of aspiration and, as such, can be expected to reflect their past academic performance.

TABLE 3

MEANS (AND STANDARD DEVIATIONS) ON MEASURES OF PAST ACADEMIC PERFORMANCE AND SELF-RATINGS OF STANDING AMONG CLASSMATES AND CHANCES OF SUCCESS IN THE ENTRANCE EXAMINATION.

	STABLE				PSYCHOTIC			
	Extraverted		Introverted		Extraverted		Introverted	
Variable	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Mathematics—Boys								
Past failure	0·19	(0·48)	0·10	(0·31)	0·32	(0·76)	0·27	(0·60)
Partial failure ...	0·84	(0·86)	0·73	(0·90)	0·97	(0·92)	1·00	(1·17)
Self-rated academic standing	2·94	(0·72)	3·10	(0·96)	2·76	(0·89)	2·95	(0·92)
Self-rated chance of success	2·66	(0·88)	2·79	(0·87)	2·37	(0·88)	2·46	(0·89)
Natural Science—Boys								
Past failure	0·21	(0·47)	0·18	(0·51)	0·31	(0·54)	0·25	(0·46)
Partial failure ..	0·91	(0·96)	0·93	(0·99)	1·11	(0.95)	1·21	(1·10)
Self-rated academic standing .	2·95	(0·87)	2·97	(0·88)	2·88	(0·87)	2·92	(0·82)
Self-rated chance of success	2·54	(0·96)	2·64	(1·06)	2·57	(1·11)	2·56	(0·97)
Natural Science —Girls								
Past failure	0·09	(0·29)	0·09	(0·28)	0·12	(0·32)	0·23	(0·53)
Partial failure ..	0·50	(0·73)	0·71	(0·84)	0·53	(0·65)	1·02	(0·95)
Self-rated academic standing	3·33	(1·10)	3·11	(0·98)	3·12	(0·87)	3·23	(0·92)
Self-rated chance of success	2·52	(1·16)	2·52	(0·68)	2·41	(0·77)	2·46	(0·74)

From Table 3 it would appear that stable subjects as a group have reported smaller frequencies of past failure and a more positive view of their academic standing and chances of success (20 out of 24 cases). Within the stable and psychotic groups, however, the difference between the extraverted and introverted subgroups is much less marked. For the male group, there is some evidence that introverted subjects have reported somewhat smaller rates of past failure and have presented a more successful picture of themselves than their extraverted counterparts. The reverse of this tendency is shown by girls. Few of the observed differences, however, are large enough to be significant.

That the differences between the four personality groups are not limited to cognitive functioning but extend to their family background is indicated by Table 4. Here again, the overall picture is that the stable extraverted subjects tend to come from better homes, both in terms of parental education and income and the perceived emotional atmosphere of the family. Unstable extraverts, however, present the least attractive family background while stable introvert and psychotic introvert subgroups occupy the second and third positions, respectively. Here the large difference between the stable and psychotic extravert subgroups indicates the need for a consideration of the joint impact of the two personality variables.

TABLE 4

MEANS (AND STANDARD DEVIATIONS) OF THE FOUR PERSONALITY GROUPS ON THE SELF-RATED MEASURES OF PARENTAL BACKGROUND.

Variable	STABLE				PSYCHOTIC			
	Extravert		Introvert		Extravert		Introvert	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd
Mathematics—Boys								
Father's education	4·43	(2·67)	3·26	(2·40)	3·94	(2·49)	3·71	(2·35)
Family finances ..	3·50	(0·67)	3·33	(0·82)	3·19	(0·73)	3·27	(0·75)
Parental relations	4·24	(1·16)	3·80	(1·62)	3·75	(1·39)	3·82	(1·43)
Relations with father	4·18	(1·40)	3·98	(1·59)	3·69	(1·56)	3·95	(1·41)
Relations with mother	4·46	(1·16)	4·58	(0·94)	4·25	(0·99)	4·41	(1·01)
N	99		85		118		82	
Natural Science—Boys								
Father's education	3·68	(2·09)	3·00	(2·25)	3·54	(2·52)	3·75	(2·34)
Family finances ..	3·35	(0·55)	3·26	(0·80)	3·37	(0·86)	3·14	(0·73)
Parental relations	4·17	(1·18)	3·86	(1·51)	3·66	(1·54)	3·75	(1·35)
Relations with father	4·30	(0·99)	4·21	(1·26)	3·76	(1·51)	3·99	(1·33)
Relations with mother	4·20	(1·32)	4·39	(1·11)	4·20	(1·38)	4·32	(1·05)
N	76		72		98		77	
Natural Science—Girls								
Father's education	4·86	(2·48)	4·45	(2·45)	4·18	(2·84)	3·64	(2·27)
Family finances ..	3·90	(0·72)	3·77	(0·63)	3·35	(0·68)	3·61	(0·80)
Parental relations .	4·33	(1·08)	3·77	(1·51)	3·44	(1·54)	3·90	(1·24)
Relations with father	4·28	(1·14)	3·87	(1·54)	3·09	(1·91)	4·13	(1·14)
Relations with mother	4·78	(0·46)	4·57	(0·75)	3·79	(1·41)	4·51	(0·90)
N	42		56		34		39	

DISCUSSION AND CONCLUSIONS

The findings are unequivocal inasmuch as they indicate a negative relationship between psychoticism and cognitive efficiency in terms of scoring high on traditional tests of intelligence and attainment. If the differences are not always large enough to be statistically significant, the reason should be sought in the low reliability and validity of both the criterion variable and measures of cognitive performance. In the first place, because of the low correlation (r —·20 or less) between psychoticism and the main dependent variables, it is probably unrealistic to expect that the upper and lower halves of the distribution of p should be significantly different on all the dependent variables. A comparison of the two more extreme positions on the psychoticism scale may have resulted in many more significant differences. This has, indeed, been shown to be the case (Mehryar, Khajavi and Hosseini, 1972). Secondly, the majority of scales used for the assessment of dependent variables are *ad hoc* experimental measures of unknown reliability and validity. This is particularly true regarding the multiple-choice achievement tests employed as part of the selection battery. As an indication of the psychometric inadequacy of these tests, it might be sufficient to mention that the small means (and relatively large sd's) of Table 1 belong to tests comprising from 40 to 80 items. Few of the scores based on these apparently difficult tests could be regarded as normally distributed. Measures of Tables 3 and 4, on the other hand, were based on subjective reports and judgments with all the vitiating tendencies known to be associated with such reports. In view of these complications, it is indeed surprising that the p scale has produced such a consistent picture.

With regard to extraversion the observed differences are much less marked and consistent. Thus extraversion would appear to go with superior achievement in boys but with inferior performance in girls. The reverse of this tendency is shown by self-report measures of past academic performance.

The almost total lack of correlation between the neuroticism scale and measures of intellectual performance is all the more interesting in view of the relatively high correlation between it and the psychoticism scale ($r = {\cdot}48$ in the total population of 1008). To further investigate the possible relationship between neuroticism and intellectual achievement, boys scoring very high (15+) or very low (7 –) on the neuroticism scale were chosen. They were further subdivided in terms of extraversion thus giving rise to four groups: neurotic extravert, neurotic introvert, stable extravert, and stable introvert. Means and standard deviation of these four groups on the three main measures of intellectual performance are given in Table 5.

TABLE 5

MEANS AND STANDARD DEVIATIONS OF THE FOUR GROUPS FORMED IN TERMS OF NEUROTICISM AND EXTRAVERSION ON THE THREE MAIN MEASURES OF COGNITIVE EFFICIENCY.

Personality Group	N	Otis Test Mean	Otis Test sd	English Test Mean	English Test sd	Persian Test Mean	Persian Test sd
Stable extravert	104	38·69	9·50	20·03	15·17	17·74	8·37
Stable introvert	92	34·50	11·36	17·42	14·63	17·05	9·38
Neurotic extravert	97	36·77	10·94	18·85	14·42	17·57	8·75
Neurotic introvert	94	35·29	10·66	18·50	14·90	16·62	9·42

A comparison of Table 5 with Table 1 reveals that the two much more extreme cut-off points along the neuroticism scale have effected smaller differences than the more or less equal halves along the psychoticism scale. The lower scores of stable and neurotic introverts in comparison with their extraverted counterparts is probably an indication that in this classification the extraversion-introversion dimension plays a more important role than the neurotic-stable dimension. The very low score of the stable introvert group on the intelligence scale is particularly interesting.

In conclusion, then, the Iranian subjects of this study would appear to be more like British children aged below 15 years than their college level age-mates. Whether this same pattern will obtain among Iranian university students or those tested under less anxiety arousing conditions will have to be determined. Data available for a group of Pahlavi University students tested in their second and third years would seem to indicate that highly successful students (N=41) are still somewhat more extraverted (12·02) and less neurotic (11·48) than their least successful (N=29) classmates, whose mean extraversion and neuroticism scores are 11·17 and 11·93, respectively.

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CHILDREN'S EXPERIENCE OF READING AND NOTIONS OF UNITS IN LANGUAGE

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SUMMARY. Downing (1970) has shown that young children learning to read experience difficulty in understanding the technical vocabulary of teaching reading and has suggested that this is due to their inability to understand abstract concepts. This study confirms some of the difficulties and traces their resolution, attributing them not so much to the children's limited cognitive abilities and the abstract nature of the concepts, as to unfamiliarity with an analytical approach to language and to the range and overlap of reference in use of the terms.

INTRODUCTION

Downing (1970) has indicated that very little is known about 5- to 6-year-old children's understanding of terms such as ***read, word, letter*** and ***sound*** which are frequently used in teaching reading. From a replication and extension of Reid's (1966) interview method and an experiment in recognition of heard units he concluded that, when learning to read, children showed confused notions of the purpose and process of reading and that they had special difficulty in understanding abstract terms such as ***word*** and ***sound***. He discussed his and Reid's findings in terms of Piaget's (1959) indications that children in the intuitive stage of thinking find any abstract concepts difficult, and in terms of Vygotsky's (1962) findings that children only have a vague idea of the usefulness of reading and writing and that they find the abstract nature of written language to be a stumbling block.

There is, however, an important difference between understanding concepts, as described by Piaget, and identifying words. Vygotsky referred to the difficulty of operating with words as perceived or written units abstracted from the flow of speech or ideas. Such operations are different from understanding a technical term, especially one most frequently used in speaking to children.

The research to be reported in this paper is part of a more general investigation into the speech, reading and writing of 5- to 7-year-olds (Francis, 1971). It is designed to trace children's comprehension of instructional terms and their abilities to identify units in written and spoken language while they learn to read.

METHOD

Subjects.

All the children admitted to a Leeds primary school with birthdays between September 1st, 1962, and April 3rd, 1963, were seen at six-monthly intervals, the mean age at the first testing being 5 years 9 months, and at the last 7 years 3 months. Although a few children left the school and others of the same age were admitted during this period, 20 boys and 30 girls were present for all four test occasions. The sample was deliberately chosen to represent children of good social background and with more than average ability. Social class, as determined by father's occupation, ranged from Class I to Class III, and vocabulary scores on the Stanford-Binet scale gave a mean of 8.9 and a standard deviation of 2·1 on the final test occasion. These compared with a standardised mean of 7·4 and a standard deviation of 2·1 for children of the same chronological age (McNemar, 1942).

School.

School experience was similar for all the children but adjusted to individual needs and development. The children first spent some time becoming familiar with their school and classroom, where some rooms, items of furniture and equipment, and personal lockers were clearly labelled. Pictures and posters and items of work decorated the walls, often with short accompanying legends. When more formal reading began the children worked their way through the McKee reading scheme, reading individually to the teachers. At first something like a " Look and say " approach predominated, but a phonic approach was dovetailed into this as the children responded both individually and in class teaching to this more analytic method. Children were encouraged to write in parallel with learning to read.

Test procedure.

The author visited the school for pilot study work with other children so her presence was not strange. The children were tested individually in a small store room adapted for the purpose and, except for a few very shy children, needed little encouragement to take part in the testing. The items exploring reading experience were part of a battery of various language tests which was sub-divided and presented to each child in two 20-minute sessions on different days.

Tests.

Details of each test are best described separately with the results, but the battery comprised tests of:

(*a*) Reading progress as measured by the Schonell Graded Word Reading Test together with progress in the school reading scheme.
(*b*) Understanding of concepts *letter, word* and *sentence,* explored by asking for examples, recognition and ideas about use.
(*c*) Ability to identify suffixes by sound and by sight, explored by seeking the reasoned choice of two similar words from a set of three, where one item did not carry the suffix.
(*d*) General understanding of concepts by a vocabulary test.

RESULTS

(*a*) *Reading progress.*

The two measures of ability, the Schonell test scores and progress in the McKee graded reading scheme yielded a high measure of correlation (Kendall rank order coefficient ·71 at the last testing). They supplemented each other in that completion of the reading scheme was judged to indicate an ability to try to read any simple book, while the Schonell test list was different from the vocabulary of the reading books. 13 children completed the reading scheme at a Schonell reading age of 7·5 years or more, while a further six did so at 7·0—7·4 years. Only two children scored above 7·5 years before completing the scheme, these scores being obtained on the first two occasions when the children concerned were well on their way to completion. A few children moved through the reading scheme in spite of continued low scores on the Schonell test, presumably learning to recognise the reader vocabulary but very little else.

Reading progress for the group is reported in Table 1, but because of the shortcomings of the standardisation of the Schonell test (Bookbinder, 1970) 'the scores should not be interpreted as doing more than describe the progress of this particular group of children.

TABLE 1

NUMBERS OF CHILDREN AT VARIOUS READING AGES.

Schonell reading age	Mean chronological age, yrs. : mths.			
	5 : 9	6 : 3	6 : 9	7 : 3
<5 : 0	26	7	6	2
5 : 1—6 : 0	19	30	21	13
6 : 1—7 : 0	3	6	10	10
7 : 1—8 : 0	1	4	6	14
8 : 1—9 : 0	1	2	5	6
>9 : 0	0	1	2	5
	50	50	50	50

(*b*) *Understanding of concepts 'letter,' 'word' and 'sentence.'*

The children were first asked:

" Can you tell me a letter—any letter you know ? "

" What do we use letters for ? "

These questions were repeated for a *word* and a *sentence*, and if children had any notion of a sentence they were asked how they knew when they came to the end of one when reading or listening. Finally, the children were shown a card with two examples of each category randomly arranged and each in a well-defined outlined space, and were asked to identify one example of each. The instructions made it clear that an example " all by itself inside a space " was required, and if children pointed to incorrect examples they were asked if they meant all of the item within the boundary lines, this being indicated by a movement of the finger over the whole item. Thus, the possibility of recognising individual letters within words or words within sentences was met.

TABLE 2

RECOGNITION OF EXAMPLES OF LETTERS, WORDS AND SENTENCES.

Example chosen	Example and occasion of presentation											
	letter				word				sentence			
	1	2	3	4	1	2	3	4	1	2	3	4
letter	22	45	48	49	13	12	10	2	13	5	0	0
word	13	5	1	0	30	34	39	47	13	10	7	1
sentence	15	0	1	0	7	2	1	0	24	28	40	48
nil	0	0	0	1	0	2	0	1	0	7	3	1

The results of the recognition test (Table 2) show that the concept *letter* presented least difficulty overall, but that it was too novel on the first occasion for a letter to be recognised more readily than a word. When an error was made neither *word* nor *sentence* seemed to be clearly understood for examples of both were chosen equally. After the first occasion the concept *word* was less clearly understood than *letter* until the last testing, being confused throughout more with *letter* than with *sentence*. Until the fourth testing, when it was well understood, *sentence* was confused with *word* rather than *letter*.

TABLE 3

GIVING EXAMPLES OF LETTERS, WORDS AND SENTENCES.

Example given	Example and occasion of requirement											
	letter				word				sentence			
	1	2	3	4	1	2	3	4	1	2	3	4
letter	31	43	43	47	4	5	2	0	0	0	0	0
number or name	9	1	0	0	13	8	6	1	0	0	0	0
word	3	4	3	2	22	33	36	46	2	2	3	4
sentence	0	0	0	0	1	1	1	0	13	12	17	32
nil	7	2	4	1	10	3	5	3	35	36	30	14

Table 3 shows the results of asking for examples of each concept. The same pattern is evident, though even at the first testing examples of letters were given more readily than of words. It should be remembered that this task preceded that for recognition so the children had been given no cues to assist them, nor were they told whether their examples were accurate, so they were not trained for the recognition task. It was interesting that sometimes numbers were given as examples of letters. Words were provided well on the last occasion, previous confusion occurring with numbers or Christian names more than with letters or sentences. Such confusion was, of course, within the area of the concept and indicated at least a partial understanding. Sentences were not so well provided, although on the fourth occasion more were produced, but it was noteworthy that they were not confused with words or letters.

The findings from both approaches indicated that the children learned the concept *letter* before *word*, and *word* before *sentence*, the two latter concepts being mastered while children were already reading. The apparent derivation of the concepts from the reading process was confirmed by the results of exploration of the concept in use. The children's responses were more discriminating in the case of *letter* than for *word* or *sentence*, though an increasing awareness of the hierarchical nature of the concepts emerged. For example, answers to ' What do we use letters for ? ' ranged from a rather undiscriminating ' Writing ' and ' Helping us to read ' to ' Writing words,' ' Making words ' and ' Spelling.' Answers to the question about use of words also included vague references to reading and writing but also included specific answers like ' Names ' and ' Making sentences.' More discriminating replies about use of sentences were ' For making stories,' ' Poems,' ' Writing letters (postal) ' and ' Writing news.' The outstanding feature was the almost universal reference to spelling, reading and writing. Almost no replies indicated an awareness of the use of words or sentences in the spoken language. The additional question about recognition of a sentence ending in reading and in listening produced prompt responses of ' full stop ' or ' end of line ' in the case of reading, especially on the fourth occasion, but in the case of listening the children were puzzled and gave fewer responses, venturing an uncertain ' you stop ' or ' pause.'

These tests, therefore, indicated that children learned the concept *letter* in the process of learning to read, and derived the concepts *word* and *sentence* from their mastery of reading and writing, giving little indication that they were inclined to relate them to spoken language. Indeed, some children indicated in informal conversation that they thought a pause occurred between all spoken words because there were spaces between words in writing.

Overall, female students were proportionately represented among the convergers, divergers and all-rounders, but only one convergent non-scientist and two divergent scientists were female.

TABLE 1

CONVERGENCE/DIVERGENCE SCORES BY FIELD OF STUDY.

Field of Study	Convergers			Divergers			All-rounders		
	N	M	SD	N	M	SD	N	M	SD
Science	35	5·23	2·26	13	5·08	2·29	108	5·39	2·60
Non-Science	18	7·11	2·56	38	8·92	2·34	94	8·13	2·17
t between science/ non-science....	2·74(P< ·01)			5·14 (P< ·001)			8·17 (P< ·001)		

The mean scores of convergers, divergers and all-rounders on the refined Joyce-Hudson scale were respectively 5·87±2·53, 7·94±2·87 and 6·67±2·77. All the differences are significant beyond the 5 per cent level and appear at first sight to validate the scale But when the three groups are divided according to field of study, it becomes clear that the differences are mainly related to subject specialism. In Table 1 all the differences between science and non-science specialists are significant beyond the 1 per cent level whilst within these categories only the difference between non-science divergers and non-science convergers reaches significance (P< ·05). The same trends occurred when all 20 items were used from the scale showing, perhaps, that Joyce and Hudson's own work has not been too greatly affected by the use of the full scale.

TABLE 2

FREQUENCY OF 'AGREE' RESPONSES FOR SELECTED ITEMS FROM THE SCALE.

Item Number (See Appendix)	Non-Science						Science					
	Convergers (N=18)		Divergers (N=38)		All-rounders (N=94)		Convergers (N=35)		Divergers (N=13)		All-rounders (N=108)	
	F	%	F	%	F	%	F	%	F	%	F	%
6	15	83	15	40	47	50	27	77	11	85	76	70
8	14	78	25	66	66	70	21	60	12	92	85	79
9	7	39	25	66	47	50	1	3	0	0	8	7
11	16	89	22	58	60	64	25	71	10	77	85	79
13	15	83	31	82	75	80	11	31	4	31	60	56
17	2	11	7	18	18	19	5	14	6	46	21	19

That the scale is mainly a measure of subject orientation is confirmed by a detailed examination of responses to individual items using χ^2 (Table 2). Not surprisingly, the two items showing the highest correlations with the factor (see Appendix): "I am more interested in literature than in any form of technology" (9) and "I would rather make a speculation about human nature than learn a fact about a machine" (13) consistently distinguish between science and non-science students, irrespective of their relative performance on intelligence and open-ended tests ; (comparisons of response frequencies for science and non-science convergers, divergers and all-rounders all give significant differences beyond the 0·1 per cent level, but there is no significant difference between the responses of science convergers and divergers or non-science convergers and divergers). Within the science category, only two items : " Faced with a new idea I would rather examine it in detail than offer a general comment " (8) and " I believe that ' falling in love ' can be explained in physiological terms " (17) distinguish between convergers and divergers but in the *unexpected* direction (P< ·05 in both cases). Just two items , " I like to work very precisely " (6) and " I prefer thinking about problems in terms of specific points rather than generalities " (11) distinguish successfully between convergers and divergers in the non-science category (P< ·005 in item 6 and P< ·025 in item 11). As might be expected, none of the six items excluded from the refined scale distinguishes in the predicted way either between or within the science and non-science categories.

TABLE 3

MEANS FOR CONVERGERS, DIVERGERS AND ALL-ROUNDERS ON INDIVIDUAL TESTS (SD IN PARENTHESES).

Test	Convergers (N=53)		Divergers (N=51)		All-rounders (N=202)	
AH5 Total	43·89 (6·01)		28·76 (6·85)		35·34 (7·24)	
Uses	15·89 (5·00)		31·47 (8·99)		22·51 (7·38)	
Consequences....	9·55 (3·30)		14·22 (4·00)		11·47 (3·72)	
	Science	Non-science	Science	Non-science	Science	Non-science
AH5 Part I	19·86 (3·24)	20·28 (3·69)	13·38 (2·87)	13·58 (3·82)	16·15 (4·28)	16·41 (4·22)
AH5 Part II	24·66 (3·51)	22·39 (4·29)	15·62 (4·99)	15·11 (4·43)	19·81 (4·27)	18·22 (4·20)
AH5 Total	44·51 (5·58)	42·67 (6·59)	29·00 (6·72)	28·68 (6·90)	35·95 (7·36)	34·64 (7·03)
Uses	16·49 (5·10)	14·72 (4·60)	29·92 (11·46)	32·00 (7·90)	21·81 (8·01)	23·31 (6·49)
Consequences ..	9·37 (3·34)	9·89 (3·18)	15·38 (3·45)	13·82 (4·09)	11·50 (3·96)	11·43 (3·43)

Convergers, divergers and all-rounders have been identified in terms of their relative scores on the AH5 and open-ended tests and this is clearly portrayed in the upper part of Table 3. All the differences between the mean scores of the tests for the three groups are highly significant (P< ·001 in all cases). As the *total* AH5 score was used as the criterion for convergence, it was thought that possibly the Part I (verbal+numerical) and Part II (spatial) mean scores would vary for the science and non-science categories. This was not the case ; in fact, none of the differences between the mean scores of scientists and non-scientists for any of the tests shown in the lower part of Table 3 was significant.

DISCUSSION

As an alternative means of identifying convergers and divergers as defined by performance on intelligence and open-ended tests, the Joyce-Hudson scale is not satisfactory. It seems clear that the scale is essentially a measure of science and non-science orientation and the linkage with convergence/divergence is mainly indirect. The internal consistency demonstrated by factor analysis and inspection of the items confirms that the scale is largely a self-rating of subject bias. A simple scale which effectively estimates convergence/divergence would be extremely useful and its construction should be attempted. However, whilst we appreciate that subject attitudes and interests which distinguish science from non-science students are likely to feature as one aspect of the scale, we suspect along with many others (see Butcher, 1968) that there are several other cognitive and non-cognitive dispositions of convergers and divergers which need to be taken into account in the design of such a scale.

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APPENDIX

C/D QUESTIONNAIRE

Below are some statements which relate to ways of thinking. Read the first statement and if you agree put a tick in the column headed 'Agree.' If you do not agree with the statement, put a tick in the column headed ' Disagree." Answer *all* the statements in this way.

	Agree	Disagree	Factor loadings* in first component
1. I seem to do rather well at intelligence tests.			—0·0725
2. I prefer a problem to have one right answer.			**—0·5090**
3. I enjoy closely reasoned argument			**—0·2870**
4. I find it easy to switch from one line of thought to another			**0·3520**
5. I think it desirable to be highly imaginative			0·0399
6. I like to work very precisely			**—0·5546**
7. I prefer to reason in terms of words rather than of number or symbols			**0·6097**
8. Faced with a new idea I would rather examine it in detail than offer a general comment			**—0·4513**
9. I am more interested in literature than in any form of technology			**0·8193**
10. I would rather work with things than with people			**—0·6201**
11. I prefer thinking about problems in terms of specific points rather than generalities			**—0·5403**
12. I like to discuss human problems (e.g., Psychology, Medicine) in relation to real people, rather than imaginary or ' typical ' cases.			0·2077
13. I would rather make a speculation about human nature than learn a fact about a machine			**0·7584**
14. I enjoy discussing personal relationships			**0.5426**
15. I think that facts matter more than opinions			**—0·5519**
16. I dislike revealing my feelings to other people			**—0·2878**
17. I believe that ' falling in love ' can be explained in physiological terms			—0·1116
18. I dislike the idea that science will one day explain every aspect of human experience			**0·3119**
19. I was happy at school			—0·2440
20. I like to feel that no one has quite the same thoughts as myself			—0·1111

* Loadings of approx. ±0·3 and greater are taken as significant.

ACHIEVEMENT ORIENTATION, INTELLECTUAL ACHIEVEMENT RESPONSIBILITY AND CHOICE BETWEEN DEGREE AND CERTIFICATE COURSES IN COLLEGES OF EDUCATION

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SUMMARY. Enrolment in B.Ed. as opposed to certificate courses in a sample of 168 college of education students matched by sex, academic qualifications, and course requirements was found to be associated with high N Ach, high internalization of responsibility for success, and low internalization of responsibility for failure. Personal orientation towards achievement is suggested as a critical yet relatively unresearched variable in college course choice and selection.

INTRODUCTION

Reading for a four-year B.Ed. degree rather than a three-year Teacher's Certificate in a college of education represents at one and the same time, the opportunity to pursue a qualification of higher prestige, the possibility of enhanced professional achievement, a longer and academically more rigorous course, and an increased risk of failure. National statistics show that only one quarter of the 37 per cent of students entering colleges of education with two or more A-level passes proceed to the final examinations of the B.Ed. degree (ATCDE, 1972). Regional variations (from 12 per cent to over 50 per cent) among such qualified final students indicate that both university regulations and college selection procedures operate as important determining factors in entry to B.Ed. courses. Poor student motivation and deliberate preference for certificate courses, especially among female students, have also been identified as probable causal factors (ATCDE, 1972).

Need for achievement.

The literature on achievement motivation suggests that students with a high need for achievement are more willing to associate with high status targets and to prefer the company of high status others (Mehrabian, 1968, 1969) ; are more ready to approach achievement-related tasks (Weiner and Potepan, 1970) ; are better able to delay gratification (Mischel, 1961), and have a stronger motivation to achieve success than motivation to avoid failure (Atkinson, 1964).

Intellectual achievement responsibility.

There is some evidence to suggest that an individual's perception of his own control over achievement in educational situations is related to the amount of time he will spend at achievement-related tasks and to his success in them. Grade-school children who attributed success and failure to themselves (ability and /or motivation) as opposed to external sources (luck, difficulty of task, etc.) spent more time and were more successful at achievement activities (Crandall, Katkovsky and Preston, 1962). A further study of children concluded that a belief in self-responsibility predicted " behaviour in tasks where motivational factors account for a relatively large proportion of the variance over and above ability or acquired knowledge " (Crandall, Katkovsky and Crandall, 1964). In the setting of a university, ' superior ' compared with ' failing ' students have been shown to be more likely to attribute success to their own ability and motivation (' internalized success ') and less likely to attribute failure (' internalized failure ') to those sources (Weiner and Potepan, 1970).

THE STUDY

The major hypothesis of the present study was that individuals with high need for achievement and high intellectual achievement responsibility would be more attracted to the opportunities provided by B.Ed. as opposed to certificate courses in colleges of education. The study focused upon these two aspects of motivation in a sample of similarly-qualified students enrolled in B.Ed. and certificate courses in five northern colleges of education.

The Sample.

The sample consisted of 168 students drawn from one all male, two all female and two mixed colleges of education in two University Area Training Organisations producing a smaller than average proportion of B.Ed. graduates.

The sample design held constant student entry qualifications, ATO regulations on B.Ed. courses, college selection procedures, and availability of subject courses.

The students, all of whom had at least two GCE A-levels, were in the second year of their courses, selection for B.Ed. having been made at the end of the first year. Of the 168 students, 115 were following the degree course (57 male and 58 female) and 53 were following the certificate course (26 male and 27 female). Some of the certificate students were better qualified in terms of the number and the grades of their A-levels than many of the degree course students.

Method.

Need for Achievement. Need for achievement (N ach) was assessed by means of the Mehrabian Achievement Orientation Scale, a 26-item self-rating instrument slightly modified for use with British respondents (Mehrabian, 1969). The scale measures individual *affect* (hope or fear), *behaviour* (approach or avoidance), and preference for *level of risk* in response to achievement contexts (for example, " I more often attempt difficult tasks that I am not sure I can do than easier tasks I believe I can do "). Responses are made on a 9-point scale ranging from very strong agreement (+4) to very strong disagreement (–4).

Intellectual Achievement Responsibility. Intellectual Achievement Responsibility was measured by means of a 28-item scale developed for use with college students by Weiner and Potepan (1970) from Crandall's (1962) original scale. The Weiner and Potepan version was modified slightly for use with British subjects. The scale consists of 28 pairs of alternative statements. Respondents choose the one alternative that they agree with most. For example, " When you understand a complex point clearly during a lecture it is usually because (*a*) the instructor explained it well or (*b*) you were listening carefully." The six subscales detailed in the footnotes to Table 2 below are derived from the various items.

RESULTS

Table 1 shows that the difference between B.Ed. and certificate course students' mean scores on need for achievement was significant ($P < \cdot 001$) and in the predicted direction.

TABLE 1

MEAN ACHIEVEMENT ORIENTATION SCORES IN B.ED. AND CERTIFICATE COURSE GROUPS.

Group	N ach		N
	Mean	sd	
B.Ed. students	6·95	19·68	115
Certificate students ..	–1·54	16·25	53

$t = 2 \cdot 94$ $P < \cdot 001$ (one tailed test)

The differences between B.Ed. and certificate course students in respect of intellectual achievement responsibility scores closely paralleled those reported by Weiner and Potepan in their comparison of ' superior ' and ' failing ' students. The B.Ed. group as compared with the certificate group scored significantly higher on success attributed to ability and lower on failure attributed to ability. Degree course students were higher on internalized success and lower on internalized failure than the certificate course group (see Table 2).

TABLE 2

Mean Intellectual Achievement Responsibility Scores in B.Ed. and Certificate Course Groups.

Group	A+	M+	I+	A—	M—	I—
B.Ed. students	5·07	4·17	9·23	4·15	3·98	8·13
Certificate students	4·31	4·06	8·20	4·57	3·94	8·56
t	2·68	<1	2·55	1·55	<1	1·37
P (one-tailed tests)	·001	NS	·005	NS	NS	NS

A+ =success attributed to ability ; M+ =success attributed to motivation ; I+ =internalized success ; A—=failure attributed to ability ; M—=failure attributed to motivation ; I—=internalized failure.

DISCUSSION

Despite similar educational backgrounds and comparable levels of academic success at school, two groups of college of education students have been shown to respond differently to the higher educational opportunities open to them. One group, the B.Ed students, are characterized by high need for achievement and a tendency to attribute success, but not failure to ability. Certificate students, on the other hand, have been shown to have significantly lower need for achievement, to be less ready to attribute success to ability and more ready to attribute failure to that source. The two groups are differentiated in their perceptions of academic achievement both in their orientations towards achievement and in their control over it.

To what extent these differences in student motivation are the result of pre-college experiences or the impact of the college course itself or some combination of both of these factors, is unknown.

Whilst the present study can provide no information concerning the pre-college motivational characteristics of the student sample there is evidence in the British and American literature of differences in N ach and intellectual achievement responsibility from as early as primary school age (Robinson, 1964 ; Bruckman, 1966 ; Smith, 1969 ; Crandall *et al.*, 1962, 1964).

Again there are no data at hand relating to the motivational scores of the B.Ed. group in its first year in college by which to affirm or deny the argument that the achievement orientation of that group is directly associated with selection for the degree course at the end of the first year. Some parallel data, however, gathered from a sample of fourth year B.Ed. students raises some doubts concerning explanations of motivational differences in terms of college impact.

Thirty fourth year students who had successfully passed Part I B.Ed. degree finals, a more positive reinforcement than that accorded the second year B.Ed. students in the main sample, also completed the Mehrabian and the modified Crandall scales. Comparisons of the mean scores of fourth year and second year B.Ed. groups revealed almost identical scores on N ach and intellectual achievement responsibility, suggesting that these motivational dispositions may be relatively unaffected by the college experience itself.

In the absence of relevant research evidence one conclusion of the present inquiry is that an individual's need for achievement is a critical yet relatively unexplored factor in determining his approach to (and perhaps his success in securing a place on) a degree course in a college of education.

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RANKING OF STUDENT TEACHER PERFORMANCE

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Summary. Concerned about the problem of evaluation, the staff of an Ontario College of Education performed an experiment on the ranking of student teacher performance. The results of the study, which involved only 13 students and a like number of staff, indicated a high measure of consistency in ranking. More important, the ensuing discussion suggested the need for more refined research on this problem.

INTRODUCTION

The evaluation and grading of the classroom performance of student teachers is a persistent problem for those involved in preparing these candidates for professional status. The need for evaluation is not disputed. The students require periodic indications of the nature of their progress towards teaching competence. Employers demand a statement of relative grading for each student. Decisions on certification are based, to a large extent, on perceived proficiency in practice teaching.

Acceptance of the need to evaluate by no means is paralleled by availability of the means of doing so. Controversy has centred on who should do the evaluating, what criteria should be used, and what form the reporting should take. These areas of concern revolve around the crucial issue of the validity of the technique used. Next only to validity in importance, is the reliability of the gradings given. The apparent elasticity of the yardstick used by assessors has become of paramount concern to student teachers as the surplus of applicants has allowed the employers to become more selective. This situation has arisen particularly in the last two years in Ontario and has little likelihood of changing in the next few years. One of the reasons for recording the study was to share the results with those from other areas who may be facing similar problems. Also, a few weeks previous to this study, the staff had participated in a seminar which examined a model for evaluation. The experiment, therefore, was an initial step in an anticipated series of studies of the overall problems of evaluation.

Thus, the purpose of this experiment was two-fold. Manifestly, it was to measure the consistency with which the staff of the College of Education rank student teachers according to performance in practice teaching situations. A latent purpose was to focus discussion on the existing method of evaluating and scoring student teaching.

METHOD

The subjects consisted of 13 student teachers chosen by a staff member to be a representative sample, stratified by grade, of 109 students at the College of Education, Brock University. The student body had been ranked according to the average of gradings given by the associate teachers for six previous weekly episodes of practice teaching. The experimental group was so constituted that it represented a distribution pattern similar to that of the total group. The 13 students were arranged in groups of fours using the incomplete block design as shown in Table 1 (Maxwell 1961, p. 124).

TABLE 1

GROUPING OF STUDENTS.

	Blocks												
	1	2	3	4	5	6	7	8	9	10	11	12	13
STUDENTS	a	b	c	d	e	f	g	h	i	j	k	l	m
	b	c	d	e	f	g	h	i	j	k	l	m	a
	d	e	f	g	h	i	j	k	l	m	a	b	c
	j	k	l	m	a	b	c	d	e	f	g	h	i

The students were allotted at random to the letters. The blocks were then distributed at random to 13 staff members. Thus, each staff member received the name of four student teachers and was asked to observe the students for a minimum of 30 minutes and in the order in which the names appeared. The assessor was then to return to the experimenter a rank order for the four students based upon the observed performances. As the table indicates, this meant that each student was seen by four different assessors on separate occasions and was ranked with three different students on four occasions. Thus, each subject was paired with all other subjects for comparison purposes.

It was felt that this experimental design represented a reasonable model for the testing of two things. It produced a measure of the consistency with which staff members rank students and it made possible the comparison of the experimental ranking with a previously established rank order. The model was attractive also because it was economical of staff time.

RESULTS

The rankings reported by the 13 assessors are as tabulated in Table 2.

TABLE 2

RANKING OF STUDENTS.

	Students													
	A	B	C	D	E	F	G	H	I	J	K	L	M	
RANKS	2	3	1	1	2	3	2	2	2	4	4	4	4	
	1	3	1	2	3	3	3	3	2	4	3	4	2	
	1	4	1	1	4	1	2	4	1	3	4	4	3	
	4	1	1	1	2	1	2	2	3	3	3	4	2	
Sum of Ranks	8	11	4	5	11	8	9	11	8	14	14	16	11	Total = 130
Deviation from Mean	–2	1	–6	–5	1	–2	–1	1	–2	4	4	6	1	Mean = 10 Total = 0
Deviation Squared	4	1	36	25	1	4	1	1	4	16	16	36	1	Total = 146

Using the formula given by Durbin (1951) the coefficient of concordance is ·802. This may be interpreted as meaning that there is a high measure of agreement among the assessors in the ranking of the students. The table clearly indicates, for example, that student C is at the top of the hierarchy and student L at the bottom. Whereas most students received a fairly consistent ranking, it will be noted that students A and B received a wide range of rankings. To account for this, one must recall that the students were allotted to the staff members at random. Thus, a ranking of fourth in one group and a ranking of first in another is possible.

The experimental ranking by college staff agrees closely with the previously established ranking which was based upon the grading given by a number of associate teachers. Using Spearman's formula the rank correlation coefficient is ·81. This would suggest a high level of concurrent validity for the experimental measurements. Thus, one can assume that there is considerable agreement between staff members and associate teachers about their perceptions of what makes one student teacher more effective than another in classroom performance.

DISCUSSION

There are several potential sources of bias in the experiment, which are readily acknowledged. The selection of the subjects was not done randomly and thus reflected a bias of the experimenter. This bias ensured the inclusion of students from all major levels of the previously established ranking of the student body. Also the fact, that, with one exception, the assessors had previous knowledge of the teaching ability of the students predisposed a bias based upon expectation.

Perhaps a more serious disclaimer might be the underlying assumptions that all assessors were in agreement as to what constitutes effective teaching and were skilful at recognising the signs thereof in a 30-minutes block. Without this agreement and skill the results of the experiment would be invalid.

Apart from these readily acknowledged departures from ideal experimental conditions which qualify the nature of the claims one would make from the statistical findings, the study proved to have merit in the realisation of its *latent* purpose. After about three hours of discussion, staff members were in general agreement that the experiment and the discussion had been a worthwhile experience. Some of the observations which emerged from that discussion were as follows :

Implications for assessment.

Several assessors questioned the future success of various students in spite of their high ranking. Assessment based upon several snapshot evaluations (modelled by this experiment) presented an incomplete and perhaps misleading picture of overall ability to fulfil a teacher's role. It was concluded that the rank correlation of ·81 with associates' assessments may be a function of attention to a limited range of attributes observable in formal teaching situations of short duration.

The lack of agreement among staff members over the letter grade which should be given to each student suggested, as a priority, the development and enunciation of absolute scales for teaching behaviour.

Need for further research.

The experiment represents an easily replicable model and can be repeated alternately using associate teachers, student teachers, peers and pupils as assessors. In short, further research is needed (*a*) to indicate whether or not results will vary in relationship to the previous experience of the assessor and (*b*) to study the extent to which the amount of time the assessor spends observing student performance affects his judgment of both present competencies and potential for growth. This would appear to be especially so since, as Cook states, there is evidence that some subjects are more easily or more accurately judged than others (Cook, 1971, p. 100).

The discussion also suggested the need to investigate the extent to which the criteria upon which gradings are based change, either consciously or unconsciously, as the students get more practice teaching experience. Related to this would be a need to study patterns of gradings of individual students to discover to what extent improvement is reflected. Clearly, as Start (1972) states, grades, behaviour and improvement may also be situation specific. What is appropriate and effective in one school may be perceived as inappropriate and ineffective in another.

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STUDENT CHARACTERISTICS RELATED TO ACHIEVEMENT IN INTRODUCTORY PSYCHOLOGY COURSES

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SUMMARY. Three studies of prediction of academic achievement in introductory psychology courses are reported. The Achiever Personality scale of Fricke's Opinion, Attitude and Interest Survey and Brown and Holtzman's Survey of Study Habits and Attitudes made independent contributions beyond intelligence in the prediction of course grades in two studies. In a third study the Achievement via Independence scale of Gough's California Psychological Inventory was found to contribute to grade prediction.

INTRODUCTION

What student characteristics predict academic achievement? Intelligence is certainly important, but when we go beyond intelligence, the list of personality variables that have been found to relate to academic achievement is more impressive for its length than for the magnitude or replicability of the relationships found. Since academic achievement clearly involves many variables and their interaction (McKeachie, 1961), this would in itself not be disheartening were there some theoretical framework within which the various findings make sense and upon which further research could be planned. But this too is lacking.

TABLE 1

LIST OF STUDIES ON THE RELATIONSHIP BETWEEN NON-INTELLECTUAL VARIABLES AND PERFORMANCE IN INTRODUCTORY PSYCHOLOGY COURSES.

Study	Variable (Scale)	r
Altus (1948)	MMPI Hypomania Scale	Significant difference in mean scores between achiever and non-achiever groups*
Gough (1953)	Gough's Honor Point Ratio (Hr)†	·26 to ·60
Gough (1964)	CPI Achievement via Independence (Ai)	·29 to ·36
Bendig (1957)	Gough's Hr (Ai) Scale	·32
Bendig (1958a)	Gough's Hr (Ai) Scale	·25, ·30
Bendig (1958b)	Edwards Personal Preference Schedule (EPPS) N Ach Scale	·37
Bendig (1959)	EPPS N Ach Scale	·16
Bendig and Sprague (1954)	Guilford-Zimmerman Temperament Survey:	
	Restraint Scale	·20
	Objectivity Scale	·21
Huckabee (1968)	Cattell 16 PF:	
	Premsia Scale	·30
	Surgency Scale	—·38
Alpert and Haber (1960)	Achievement Anxiety Test (AAT):	
	Debilitating Anxiety (AAT—)	—·26
	Facilitating Anxiety (AAT+)	·23
Carrier and Jewell (1966)	AAT—	—·19 to —·57
	AAT+	·13 to ·56
Garms (1970)	66 Items from MMPI, CPI, EPPS, F-Scale and Ethnocentrism	·43, ·56

* Equated in intelligence test scores.

† The name of the Honor Point Ratio Scale was later changed to Achievement via Independence.

Yet the search goes on. Achievement in introductory psychology courses has long been a prime target for predictor research. As one would expect, intelligence has been found to be a valuable predictor of end-of-course achievement (Dysinger and Gregory, 1941; Newman, Duncan, Bell and Bradt, 1952; Portenier, 1948). Carlson, Fisher and Young (1948) found, however, that gain score (post-test minus pretest) in psychology courses did not correlate with intelligence.

A variety of non-intellective factors have been found to be related to achievement in psychology courses (see Table 1). Most, however, have not been found to account for much variance not accounted for by tests of intellectual ability.

The present study grew out of an odd mixture of empirical and theoretical interests. Two scales, Gough's Achievement via Independence of the California Psychological Inventory (1957) and Fricke's Achiever Personality of the Opinion, Attitude, and Interest Survey (1963) have been constructed by empirical methods to predict academic achievement. One of our purposes was to determine whether or not these measures predict achievement in an introductory psychology course beyond that variance accounted for by tests of intellectual ability.

We also had theoretical interests. In 1961 we suggested that student academic performance results from an interaction of teaching cues, student motives, and student habits and skills. Gough describes his Achievement via Independence (Ai) scale as designed "to identify those factors of interest and motivation which facilitate achievement in any setting where autonomy and independence are positive behaviours" (Gough, 1957). Fricke's Achiever Personality scale, is, according to Fricke "a good indicator of academic motivation and conscientiousness," but we also anticipated that a specific measure of study habits would add to its predictive power.

Thus we needed a measure of habits and skills to fit our model of the prediction of achievement. For this we turned to Brown and Holtzman's Survey of Study Habits and Attitudes (1956). The Brown and Holtzman SSHA contains items both about habits and motivation. Since we wished to disentangle motivational and habit influences we selected from the SSHA 20 items that described habits or skills.

Three studies, originally undertaken as part of a larger research project, (McKeachie, Milholland, Mann and Isaacson, 1968) are reported here.

STUDIES 1 AND 2

Subjects.

The subjects were students in introductory psychology courses at the University of Michigan. The results reported here were based only on those students who had scores on all measures used. In the first sample there were 486 usable cases out of the total 750 enrolled and in the second sample 497 cases out of 825.

Measures of Student Characteristics.

In the first sample, intellectual ability was measured by total scores on the 1949 edition of the American Council on Education Psychological Examination (ACE). In the second sample, the College Entrance Examination Board Scholastic Aptitude Test (SAT) was used.

Study habits and skills were measured by 20 items selected from the Brown-Holtzman Survey of Study Habits and Attitudes (SSHA)* (Brown and Holtzman, 1956). The items selected were those most relevant to the student's habits and skills in utilising class time, taking and organising class notes, preparing for examinations and integrating the subject matter.

Five scores of Fricke's (1963) Opinion, Attitude, and Interest Survey (OAIS): Achiever Personality (Ach P), Intellectual Quality (Int Q), Creative Personality (Cre P), Social Adjustment (SA), and Social Science Interest (SSI) were used in both studies. Scores on Alpert and Haber's Achievement Anxiety Test were also available for students in both samples.

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* Permission has been obtained from the authors and the Psychological Corporation for using this test for research purposes.

Performance Measures.

Three measures of achievement—course grades, the Introductory Psychology Criteria Test (Milholland, 1964), and a short test of psychological knowledge—were used. The Criteria Test was designed to measure skills in the interpretation and application of psychological principles learned in the course. The correlation between the Criteria Test score and the course grade was around ·50 in each sample. Both the Criteria Test and the content test were given during the final examination period as part of the total evaluation of students' learning and achievement in the course.

In the first study the knowledge test consisted of 15 multiple-choice items; in the second study a test of 25 items was given in only one of the two courses.

Results.

The correlation coefficients between student characteristics and performance measures are shown in Table 2.

Analysis of variance revealed only one significant interaction between Achiever Personality and Study Habits (SSHA) among the 12 tests made. We thus turned to multiple correlations to determine whether the non-intellective measures made independent contributions to the prediction of achievement.

TABLE 2

CORRELATION OF ABILITY, ACHIEVER PERSONALITY AND STUDY HABITS SCALES WITH ACHIEVEMENT.[a]

				Dependent Variables		
Measure	Sex	Ach P	SSHA	Grade	Criteria Test	Knowledge Test
ACE	Men	·07	·02	·41**	·41**	·21**
	Women ..	·03	—·03	·33**	·42**	·25**
Achiever Personality (Ach P)	Men		·21**	·21**	·14*	·25**
	Women ..		·34**	·14*	·18*	·01
Survey of Study Habits and Skills (SSHA)	Men			·23**	·10	·10
	Women ..			·15**	—·03	—·06
N	Men	202				
	Women ..	284				

* Significant at the ·05 level.
** Significant at the ·01 level.
[a] The correlations are those obtained in Study 1. Those for Study 2 are very similar.

As Table 3 indicates, the regression analysis for grades of male students in our first sample indicates that both the Achiever Personality (Ach P) scale and the Survey of Study Habits make independent contributions beyond intelligence to the prediction of the course grade. The multiple correlation for a second sample shrinks from ·49 to ·44. For women, however, Fricke's Social Science Interest scale provides a better measure of motivation than the Achiever Personality scale.

For the Introductory Psychology Criteria Test and the test of knowledge the Survey of Study Habits (SSHA) does not make a significant contribution to prediction. Fricke's Intellectual Quality (Int Q) scale, however, does pick up variance not accounted for by the standard measures of intellectual ability.

TABLE 3

VARIABLES MAKING SIGNIFICANT CONTRIBUTIONS TO MULTIPLE CORRELATIONS.

Group	N	Predictor Variables* and Zero Order r's	Multiple R	Cross† Validation R
I. *Course Grade as Outcome Measure*				
1st Sample				
Men	202	ACE (·41), SSHA (·23), Ach P (·21)	·49	·44
Women	284	ACE (·33), SSHA (·15), SSI (·17)	·39	·38
2nd Sample				
Men	218	SAT (·36), Ach P (·18)	·39	·39
Women	279	SAT (·41), SSI (·22), SSHA (·16)..	·47	·45
II. *Criteria Test as Outcome Measure*				
1st Sample				
Men	202	ACE (·41), Int Q (·30)	·45	·44
Women	284	ACE (·42), Int Q (·42), Ach P (·18), FA (·24)	·55	·48
2nd Sample				
Men	218	SAT (·58), Ach P (·21), Int Q(·32)	·62	·55
Women	279	SAT (·55), Int Q (·42)	·58	·53
III. *Knowledge Test as Outcome Measure*				
1st Sample				
Men	164	ACE (·21), Ach P (·25)	·32	·25
Women	204	ACE (·25), Int Q (·24)	·29	·27
2nd Sample				
Men	113	SAT (·42), Int Q (·37)	·48	·35
Women	167	SAT (·47), Ach P (·21)	·49	·41

* Code to abbreviations:

SSHA:	Survey of Study Habits and Attitudes.
Ach P:	Achiever Personality (OAIS).
SSI:	Social Science Interest (OAIS).
Int Q:	Intellectual Quality (OAIS).
FA:	Facilitating Anxiety.

† The cross validation multiple R's were computed using the standard score regression weights from the other sample on the same sex and the same outcome measure. The transformed SAT or ACE scores used were based on Fricke's conversion table (1958). For instance, the cross validation R of ·44 for men of the first sample on grades was based on the regression weights from the second sample.

STUDY 3

In another study CPI scores were available and we were interested in determining whether the Achievement via Independence scale would predict achievement beyond that accounted for by ability.

Subjects.

The subjects were 66 male and 135 female students enrolled in an introductory psychology course at the University of Michigan.

Measures.

The California Psychological Inventory was administered to all students and all scales were scored, although our primary interest was in the Achievement via Independence scale. The total score of 1949 edition of the American Council on Education Psychological Examination (ACE) was used as the ability measure. The performance measure was final course grade. Correlation coefficients between the predictors and performance measure were computed for each sex separately. Regression analyses were carried out to evaluate the degree of predictability added by the CPI scales to the ability measure.

Results.

As expected, the Achievement via Independence (Ai) scale had a significant correlation with course grade in psychology for male students. As found by Gough (1953), the Ai scale had a higher correlation (·37) than ACE (·26) with course grade. For the female students, only the ACE score correlated significantly with course grade. Regression analyses showed that the Ai scale added significant variance beyond intelligence to the prediction of performance in the male group. The multiple correlation increased to ·43 when ACE and Ai were combined as predictors, a correlation of the same order of magnitude as that found in the previous studies.

TABLE 4

CORRELATION BETWEEN ACE, ACHIEVEMENT INDEPENDENCE AND COURSE GRADE IN PSYCHOLOGY.

Measure	Men	Women
ACE	·26*	·35**
Achievement via Independence	·37**	·10
Multiple R	·43	
N	66	135

* Significant at the ·05 level.
** Significant at the ·01 level.

DISCUSSION

What measures should one use if one wishes to predict grades in psychology? Assuming that one starts with a measure of intelligence, the only additional measure contributing to predictability for both men and women is Brown and Holtzman's Survey of Study Habits and Attitudes. For male students one might also wish to use a measure of academic motivation such as Fricke's Achiever Personality scale or Gough's Achievement via Independence. It is noteworthy that neither the Achiever Personality scale nor the Achievement via Independence scale contributes significantly beyond intelligence to the prediction of grades for women even though they work for men. For women, Fricke's Social Science Interest scale should be useful.

If we compare the predicted variance accounted for by intellectual ability alone (ACE or SAT score) and the predicted variance accounted for by the combination of intellectual ability and these non-intellectual variables, we find that the mean per cent of variance accounted for in twelve samples increased from 17 per cent to 22 per cent. While this is not a large increase, the prediction of college performance is a difficult task. We suspect that every additional 5 per cent of variance will be hard won, so that these measures should not be sneered at.

The theme of our research programme has been that we should study the possible interaction effects between college environment, including teachers, fellow students, and classroom atmosphere (McKeachie, 1961), and student personality characteristics affecting achievement. Lavin (1965) in his review of personality factors as predictors for performance stated, " Essentially, we think that the literature presents a somewhat disappointing picture. Yet we do not conclude that personality variables are simply not very useful as predictors. The current disappointing state of affairs may be more a reflection upon how personality variables have been used rather than their absolute usefulness. That is to say, up to now almost all the studies reviewed conceived of the individual as if he were operating in a social vacuum. It might be, however, that personality characteristics are useful in predicting academic performance only when the social setting in which that performance takes place is conceptualised as a significant variable." Lavin makes the point that has guided our previous research. Our own studies of interaction, however, like those studies of single predictors reported in this paper, do not produce striking increases in our ability to predict student achievement. It may well be that progress in this field of many, many variables will depend upon hacking away at the variance one small bit at a time.

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THE FAKEABILITY OF THE SURVEY OF OPINIONS ABOUT EDUCATION

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SUMMARY. The Survey of Opinions about Education was administered to four groups of student teachers (N=240). In completing the questionnaire a second time subjects were asked to fake the responses in accordance with those of an ' ideal ' student on the colleges' education courses. This resulted in increased mean Radicalism scores and decreased mean Tendermindedness Scores. A sex difference was evident in students' interpretation of faking the Naturalism scale. Otherwise sex and maturity of the student did not significantly affect the extent of the induced changes in responses.

INTRODUCTION

The common tendency for subjects to ' fake ' responses to questionnaires and inventories occurs in the measurement of teacher attitudes towards educational problems. This has been recognised for some years: Getzels and Jackson (1963) have reviewed a large number of studies of the effects of various response sets upon such instruments as the ' F ' scale and the Minnesota Teacher Attitude Inventory (MTAI). In this country the MTAI was used by Evans (1958) for a conventional study of student teacher attitudes. However, during the course of the experiment a group of subjects was asked to fake a second completion of the inventory in the direction of impressing their tutor. They were able to do this successfully and Evans drew attention to this apparent weakness, also stressing the necessity for British norms.

The need for an indigenous Teacher Attitude inventory has to some extent been met by the " Survey of Opinions about Education " which has now been used for a variety of research purposes (Oliver and Butcher, 1962; McIntyre and Morrison, 1967, Oliver and Butcher, 1968). The version in current use (Oliver, 1969) has been shortened somewhat and now consists of three parts : Part I measures largely Naturalism (N) ; Part II Radicalism (R) and Part III Tendermindedness (T). A few items are scored for more than one of the three scales. The items may be scored by a simple five-point Likert system or by a weighted factorial method.

In the course of work with the "Survey" (Ward and Rushton, 1969; Rushton and Ward, 1969) the writers were interested to know whether it was sensitive to faking and, if so, to identify some conditions under which it might take place. It was decided that a representative sample of students should be invited to fake a second completion of the questionnaire in the form of an acquiescence set, the other experimental factors being sex and maturity of the subjects.

METHOD

240 first and second-year student teachers from three teacher training colleges were chosen to provide four groups of 60 : (i) female, (ii) male, (iii) mature female and (iv) mature male. Students in the ' mature ' groups were all over the age of 30.

The procedure followed was essentially that described by Evans (1958). Students met their tutors in the usual way and completed the questionnaire in keeping with the following two instructional procedures :

(1) " The questionnaire you are about to complete is not a test ; we merely want to get some idea of student teachers' attitudes to some educational problems. Your ideas will differ considerably, of course, and we expect this ; however, it is very important that you let us know what you really think when you fill in the questionnaire."

Following completion of the first administration of the questionnaire, tutors were asked to allow 15 minutes to elapse. During this period, the contents of the questionnaire were not to be discussed. Further materials were then issued and the second set of instructions given.

(2) " We are now going to complete the questionnaire again. If possible, forget what you did last time because I want you to fill in the questionnaire as if you want to impress upon me that you are my ideal student : that you understand and agree with all that I have tried to teach on the education course."

The factorial method was used to score the responses.

TABLE 1

Mean Scores on T, R and N Scales (Standard Deviations in Parentheses).

	Female under 30	Male under 30	Female over 30	Male over 30	Total
First administration					
Tendermindedness	77·7 (12·6)	77·8 (11·2)	77·1 (13·8)	74·1 (12·1)	76·7 (12·5)
Radicalism	75·4 (7·3)	70·0 (7·5)	74·1 (7·0)	69·5 (6·9)	72·2 (7·6)
Naturalism	60·1 (5·2)	60·6 (7·9)	61·2 (6·6)	62·7 (6·9)	61·2 (6·7)
Second administration					
Tendermindedness	72·6 (15·1)	69·9 (8·8)	67·9 (12·3)	66·9 (10·4)	69·4 (12·0)
Radicalism	78·6 (6·9)	73·9 (6·3)	79·2 (6·2)	74·3 (8·0)	76·5 (7·2)
Naturalism	57·9 (6·6)	64·8 (7·0)	57·4 (6·1)	65·2 (6·9)	61·4 (7·6)
N	60	60	60	60	240

RESULTS

Sample and group means and standard deviations are given in Table 1. The data upon which these were based were subjected to three-way analysis of variance with one factor repeated (Winer, 1962, pp. 337-344). The results of these analyses are summarised in Table 2.

TABLE 2

THREE-WAY ANALYSIS OF VARIANCE OF T, R AND N SCALE DATA (ADMINISTRATION FACTOR REPEATED).

	SS	df	MS	F	P
T. Scale :					
Between subjects	61229	239			
Between sexes (A)	324	1	324	1·28	·259
Between groups (B)	1052	1	1052	4·15	·042
Interaction AB	17	1	17	·07	·796
Subjects within groups	59836	236	253·542		
Within subjects	17018	240			
Repeated measure (C)	6416	1	6416	146·27	·000
Interaction AC	5	1	5	·11	·736
Interaction BC	77	1	77	1·76	·186
Interaction ABC	168	1	168	3·83	·051
CX subjects within groups	10352	236	43·864		
R Scale :					
Between subjects	21991	239			
Between sexes (A)	2876	1	2876	35·52	·000
Between groups (B)	4	1	4	0·05	·824
Interaction AB	3	1	3	·04	·847
Subjects within groups	19108	236	80·966		
Within subjects	6384	240			
Repeated measure (C)	2138	1	2138	120·65	·000
Interaction AC	0·0	1	0·0	0·0	0·0
Interaction BC	52	1	52	2·93	0·088
Interaction ABC	12	1	12	·68	·411
CX subjects within groups	4182	236	17·72		
N Scale :					
Between subjects	19478	239			
Between sexes (A)	2108	1	2108	28·81	·000
Between groups (B)	78	1	78	1·07	·302
Interaction AB	27	1	27	·37	·544
Subjects within groups	17265	236	73·156		
Within subjects	5208	240			
Repeated measure (C)	4	1	4	·24	·624
Interaction AC	1210	1	1210	72·96	·000
Interaction BC	82	1	82	4·94	·027
Interaction ABC	2	1	2	—·12	·000
CX subjects within groups	3914	236	16·584		

DISCUSSION

The means and standard deviations for the total sample (first administration) are similar to those obtained in previous work (Rushton and Ward, 1969) although the mean Radicalism score for Groups III and IV is somewhat higher than that for a group of experienced teachers. The results of the analyses of variance, however, show that the questionnaire is sensitive to faking, particularly the T and R Scales.

Changes in the scores are interesting in that the initial response to the survey was probably honest: hence there was a significant discrepancy when faking was requested. The directions of these changes are striking: students appeared to perceive the message of their education courses as one of relatively tough minded radicalism. Thus ' objective ' approaches to the teaching process were allied to the training of teachers as social change-agents. This was confirmed by later discussions with a number of individual students, and indirectly by asking one group to take the survey in the opposite direction, i.e., by completing it so as to be antagonistic to the values expressed in their course (T Scale mean 79·51, sd 10·68; R Scale mean 66·69, sd 8·10; N Scale mean 56·35, sd 7·03). Although there was some variability among group means for the first administration, the score changes were not consistently affected by either sex or maturity variables.

The lack of a significant difference between successive completions of the N Scale is difficult to assess in view of the differential way in which males and females interpreted the request to fake. In Table 1 it may be seen that faking by Groups I and III depressed scores; by comparison faking by Groups II and IV resulted in increased scores.

Examination of individual pairs of protocols did not throw any light upon this. Likewise responses to the T and R Scale items showed the considerable variability expected but did not appear to follow patterns sufficiently distinctive to merit further analysis.

Two scales of the survey are, therefore, sensitive to acquiescence sets being induced. In carrying out this research the writers were intrigued by the notion that certain teacher training institutions might promote and reinforce such response patterns in their students. On the present evidence the Survey would be extremely useful for an investigation of this possibility.

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STABILITY OF IQ OF IMMIGRANT AND NON-IMMIGRANT SLOW-LEARNING PUPILS

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SUMMARY. From the West Indian immigrant children entering a city over a period of 16 months, those suspected by teachers as being possible slow learners were seen by a psychologist. The 14 who obtained Verbal WISC scores of less than 80 were retested after a period of about 1¼ to 2½ years. A control group of non-immigrant pupils of similar ability was reassessed after a similar period. In the case of every immigrant there was a rise in score, the mean rise being over 8 points of IQ. In the case of the control group the mean rise was 0·25. The difference between these means is significant. For the immigrants the test-retest coefficient was 0·76. There was a significant positive correlation between score rise and time between tests.

INTRODUCTION

All immigrant pupils entering Leeds go initially to the Immigrant Reception Centre for a few weeks before being allocated to schools. At the centre, towards the end of a pupil's stay, teachers will have formed some ideas about appropriate schooling. Some pupils, if thought rather slow, are referred to the educational psychologist for more detailed assessment. Different assessment procedures have been adopted according to the pupils' various languages and backgrounds.

This note is concerned only with West Indian immigrant pupils. Although this group is easier to test than other immigrant groups, it nevertheless presents difficulties. We have taken the view expressed by Vernon (1965) that " the most predictive instrument for (these) immigrants is undoubtedly the Wechsler Intelligence Scale for Children, Verbal, provided the children are old enough and it is given by a tester with some familiarity with West Indian speech." Vernon concluded from his research that performance tests are less suitable. Similarly, McFie and Thompson (1970) concluded that a group of West Indian immigrants whom they studied were at a greater disadvantage on performance problems than they were on verbal ones.

Hence with West Indian immigrant pupils we have been using the Wechsler Verbal Intelligence Scale for Children along with other tests which varied from child to child. Such testing, however, was considered as only the first stage in assessment. All cases suggesting low ability were retested after an interval in this country, since it was thought that initial assessments of newly arrived immigrants were likely to be under-estimates.

If we reassess the ability of ESN pupils it might be suggested that we should expect on theoretical grounds a rise in scores due to regression to the mean (Vernon, 1960). In fact, this theoretical rise in ESN scores does not usually take place. For example, in the retest of a group of ESN pupils reported by Stein and Stores (1965) there was not a significant change in mean IQ. Indeed, Rushton and Stockwin (1963) and Stott (1960) reported decreases in the mean IQs of ESN pupils.

Nevertheless, because of the uncertainty about this, it was decided to compare the retest IQs of the immigrants in this study with those of a matched group of non-immigrants. It was hypothesised that there would be a larger increase in Verbal IQ for the immigrants than for the non-immigrants.

SAMPLE

The original immigrant sample consisted of all the West Indian immigrant pupils who entered Leeds during a 16-month period and who, referred as possible slow learners, obtained scores of less than 80 on the Verbal Wechsler Intelligence Scale for Children

This group was reduced by pupils leaving school or Leeds before being retested. Two other boys were also omitted, as these had Verbal IQs of 46 and 52 and it was found impossible to match these with similar age children in normal schools—this being one of the matched variables. The remaining 12 children, eight boys and four girls, ranged from 6 years 10 months to 11 years 11 months. Their mean Verbal IQ when first tested was 67. They were matched with a group of non-immigrant children, matched for sex, age when first tested, Verbal IQ when first tested, and retest interval.

PROCEDURE

Some of the Verbal Wechsler Intelligence Scale for Children subscales are more questionable than others when used with immigrants. One might expect problems with the Information subscale. However, with this sample this was not a major problem. On this subscale the main series of specifically British items is in the second half of the subscale. Because of the retest period most of the sample were of junior age at initial testing. If we consider an 11-year-old of IQ 75 we find he will not reach the main series of British items. Thus, this immigrant sample was not as affected by the British items as might have been expected.

As the Vocabulary subscale demands a precise knowledge of a specific form of English, it was considered that the Digit Span subscale might be more advisable in the present circumstances although under normal conditions it is less reliable. The limitations of the vocabulary sections of assessment tests for West Indian immigrants have been highlighted recently (for example, see McFie and Thompson, 1970).

Therefore, five verbal subscales including Digit Span but excluding the Vocabulary scale were given to all pupils.

The pupils were retested after a period of from 17 months to 32 months, the mean period being 20 months.

RESULTS

All 12 immigrants in the comparison study showed rises in Verbal IQ, ranging from 2 to 21 with a mean of 8·2 (sd 6·1). In contrast six controls showed rises and six scored less when retested, the range being from –5 to +7 with a mean rise of 0·25 (sd 3·7). The difference between the mean rise in Verbal IQ of the immigrants and that of the controls is significant (t=3·7).

The two immigrant pupils from the original 14 who were not included in the comparison study, i.e., those who had scores of 46 and 52 on the first occasion, showed rises of 17 and 10, respectively, on retesting. Thus, the mean Verbal IQ rise for these 14 immigrant pupils was 8·9. For these 14 pupils, the test-re-test correlation was +0·76. The correlation between rise in score and interval between tests was +0·55 ($P<\cdot05$); and the correlation between rise and initial score was –0·42 (NS).

DISCUSSION

Previous studies have shown that retesting of groups of subnormal pupils does not lead to significant increases in the mean IQ; this present study confirms this for non-immigrant pupils. In contrast, however, there is a significant rise in the mean IQ of a group of immigrants.

What might account for this difference between immigrants and non-immigrants? Clarke and Clarke (1954), studying IQ rises with older severely subnormal cases, concluded that such rises when found were the result of being removed from an adverse environment. If we examine the background of some immigrant children (e.g., London Council of Social Service, 1967), we find that education has not been compulsory and, therefore, has often been non-existent. (Whether or not this constitutes adverse circumstances is an open question.)

Rather than the child's background, however, the test situation may be important. The colour of the tester can adversely affect a child's score (Watson,* 1970). Perhaps this effect, probably extreme when immigrants first enter our school system, gradually lessens as they become more accustomed to their new country.

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*Not the present author.

We could go on speculating about the many other possible reasons why there is this difference in rise in scores. An answer to this, however, needs a detailed study of a group which should be larger than the limited sample discussed here. The main purpose of this note is not to discuss possible reasons but rather simply to point to the phenomenon with its practical importance with regard to special school allocation.

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THE EFFECTS OF TRAINING IN WRITTEN COMMUNICATION ON VERBAL SKILLS

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SUMMARY. This was a pilot study to test the effectiveness of a training procedure which it was hoped would increase students' awareness of the reader's requirements when writing descriptions of technological equipment. Pairs of students took turns at commenting on each other's descriptions. Some improvement occurred in performance on verbal items on the AH5 and in quality of written descriptions made by trained experimental subjects ($N=26$) compared with untrained controls ($N=19$).

INTRODUCTION

An important part of the professional competence of the scientist is the ability to communicate technical information to people who do not necessarily possess his specialised knowledge. Nevertheless, the structure of the educational system is such that verbal fluency and ability on the part of science students is seldom directly fostered. We were concerned with assessing the verbal skills of science and technology students and with examining the effectiveness of a simple method of improving these skills.

The rationale of this method is based on the idea that effective communication requires on the part of the communicator an awareness of the needs of his audience. He must not confuse by assuming that their knowledge is the same as his own, nor must he bore by unnecessary repetition or dwelling on points that are already clear

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Young children are not good at adapting their speech to listeners' needs: the egocentric speech of the child who assumes that other minds are in the same state as his own has been reported and commented on by Piaget (1926), Vygotsky (1934), Flavell (1966) and others. Some traces of this may persist into adulthood, and we wished to see whether instructions to bear in mind the relative ignorance of the audience, together with feedback from one who was role-playing a naive but critical reader, and the experience of role-playing such a reader, would have its effect in improving communicative skill.

METHOD

The basic design was to administer to science and technology students two short tests of verbal ability both before and after communication training. A control group did both tests twice, with no special intervening communication training.

Subjects.

26 experimental and 19 control subjects completed the experiment. The subjects were engineering undergraduates, recruited from the general studies programme in the City University, mainly male, with science GCE A-level and HND backgrounds, and information science postgraduates in the City University, about equal numbers of men and women, mostly with first degrees in science disciplines.

A further 45 subjects, some from the same sources, and some social science undergraduates, did one set of tests each but did not complete the experiment.†

The Tests and their Scoring.

The tests were perhaps unambitiously simple, but we could see no good theoretical grounds for doing more, nor did we wish to overburden our subjects. The first test was part I of the AH5, which has been standardised on students in higher education, and which comprises 23 verbal and 13 numerical items. We scored for each subject the total number of items correct, T, and the proportion of verbal items relative to the total number of items correct (V/T). We felt the latter to be a more sensitive measure of verbal (relative to numerical) ability.

The second test was the written description of an umbrella. Subjects were requested to "Write a description of an umbrella in such a way that a person who has never used one or seen one before would know what it is, how it works, and when and how to use it. Please avoid using drawings and diagrams." There were further verbal instructions to "assume that this person is a normal, intelligent English-speaking individual, an inhabitant of the British Isles, who for some reason has never happened to see an umbrella. Imagine that an umbrella is a new invention, which you are describing to an acquaintance." We felt this task to be appropriate for our subjects, since an umbrella is a piece of technological equipment, with which all would have an approximately equal degree of familiarity.

The scoring of these descriptions presented some problems (especially since most descriptions were done with fair competence)—as most people with examination and essay-marking experience will readily believe. Two judges (the authors) attempted to play the role of the hypothetical naive reader, and scored each description independently of each other and without knowledge of the source of the description. Scores (out of a maximum of 5) were given for adequacy of description of the following attributes of the umbrella and its functioning:

(1) Purpose: what it is used for, what features (portability, collapsibility) adapt it for this purpose.
(2) Appearance: what it looks like, folded and unfolded.
(3) Use: how to hold it; how to furl and unfurl it; relevant details of construction and working.

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† We compared the performance of the three kinds of students (engineering undergraduates, social science undergraduates, information science postgraduates) on the three indices of verbal skill described in this report, but did not find any significant differences. The data are not reported further because the restricted sample does not permit useful generalisation.

A further score was given for:

(4) Clarity: the general succinctness, clear organisation and readability of the description.

A maximum of 20 was thus obtainable.

We scored a total of 127 descriptions and found one of us to be slightly more generous than the other (BK mean $= 11{\cdot}46$, SD $= 2{\cdot}07$, KL mean $= 10{\cdot}11$, SD $= 2{\cdot}05$) but the difference between judges was not significant ($t = 1{\cdot}65$, df $= 252$, 2-tailed $P > 0{\cdot}05$). A product-moment correlation to test for between-judge reliability yielded $r = +0{\cdot}24$ ($t = 2{\cdot}80$, df $= 125$, $P < {\cdot}01$) of which we are not proud, although the level of significance indicates reliability. (We are both experienced essay-markers and have no reason to suspect undue incompetence; we hope colleagues will draw what moral they can from this low correlation.) The final score given each description was the mean from the two judges' scores.

Procedure.

The testing and training was conducted with groups of 15–25 subjects. The total design entailed four sessions, each lasting about an hour, and conducted at weekly or fortnightly intervals. In the first, subjects did the two tests. 10 minutes were allowed for the umbrella description, and after the AH5 practice items, 25 minutes were allowed for Part I of the AH5 test proper. In the second and third sessions, not required of the control group, subjects worked in pairs. Instructions were: " We are interested in the effects of practice in communicating information. Would you work in pairs ? Each member of a pair will be given an everyday object to describe so that a person who for some reason has never seen or used one before would be able to understand what it is, and when and how to use it. Spend a few minutes making a written description. Don't use diagrams or drawings and don't let your partner know the name of the object you are describing. When you have finished your description, give it to your partner to read. Read your partner's description; see if you can tell what the object is, and then, while pretending to be someone who has never seen the object before, point out any omissions, inadequacies or redundancies in the description. Each person should then revise his description in the light of the comments made by his partner."

Each member of each pair of subjects was asked to describe one piece of everyday technological equipment in each of the two sessions. The pieces of equipment were: a gas cooker, a pair of roller skates, a petrol cigarette-lighter, and a cold-water tap.

In the final session, the umbrella description and AHF were again completed.

Hypotheses.

These were that experimental subjects would show an improvement after training in verbal descriptions and on the verbal items of the AH5, relative to the controls.

RESULTS

Table 1 shows the mean scores on the three indices of verbal ability on the two testing occasions.

TABLE 1

TESTS OF EFFECTIVENESS OF COMMUNICATION TRAINING. MEAN SCORES ON THREE INDICES OF VERBAL ABILITY BEFORE AND AFTER TRAINING.

	EXPERIMENTAL (N=26)			CONTROL (no training) (N=18)		
	1st test	2nd test	Diff.	1st test	2nd test	Diff.
AH5 Total	18·54	21·96	3·42	18·39	23·89	5·50
AH5 V/T	0·726	0·732	0·006	0·719	0·667	—0·052
Umbrella description	10·27	10·85	0·58	10·78 (N=19)	11·24 (N=19)	0·46

Analyses of covariance were carried out on the three dependent variables (Total AH5 score, T; verbal: total items correct on AH5, V/T; and score for umbrella descriptions, U) to test whether the experimental group after training did significantly better than controls on the second testing occasion. The covariate was the score on the first test occasion. Table 2 summarises the analyses of covariance.

TABLE 2

ANALYSIS OF COVARIANCE ON THREE INDICES OF VERBAL ABILITY.

	Regression coefficient	Source	df	Adjusted SS	MS	F	P
AH5 Total ..	—0·72	Between	1	33·76	33·76	<1	NS
		Within	41	2169·32	52·91	—	—
		Total	43	2203·08	—	—	—
AH5 V/T ...	+0·0243	Between	1	0·0438	0·0438	9·13	<·01
		Within	41	0·1963	0·0048	—	—
		Total	43	0·2401	—	—	—
Umbrella description..	—0·45	Between	1	4·28	4·28	5·35	<·025
		Within	42	33·46	0·80	—	—
		Total	44	37·74	—	—	—

As can be seen, experimental subjects performed significantly better than controls on umbrella descriptions, and on the verbal items of the AH5 after communication training, although not on total AH5 performance.

DISCUSSION

The experimental training gave some suggestive results. The group who had this training did relatively better than the controls on the verbal AH5 items after training, which is surprising and rather interesting since the skills involved in doing these items are relatively remote from the explanatory set we hoped to induce during training. The trained group also produced better written descriptions of an umbrella.

There were, in fact, several confounded factors which might have been responsible for the improvements which were observed. There was the encouragement to bear in mind the reader's requirements, and the fact that the sort of reader for whom the subject was writing had been well specified; these factors were operating in both control and experimental groups. Further factors, operating in the experimental group only, were: active role-playing of the naive reader; the act of providing criticism; a final factor is that our subjects were probably well aware that we were, by our experimental treatment, seeking ways of improving verbal skill.

There may be value in further, more refined study of the immediate and long-term effectiveness of these factors in improving verbal skill, and pursuing investigations in more realistic contexts: for example by getting students or school children to play the roles of examiner or essay-marker in assessing their own and others' written work.

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BOOK REVIEWS

BARKER, P. (1971). *Basic Child Psychology*. London : Staples Press, pp. 236, £2·75.

This is a slender volume which is designed to give an introductory account of child psychiatry to students. It contains a useful glossary and reading list, and is written with a pleasing absence of medical jargon. Obviously, in an introductory text like this an author can only touch briefly on particular topics. However, it is a feature of this book that the author gets to the nub (very quickly) of each issue he deals with, and with the chapter references is able to suggest fruitful further reading.

He begins by sketching a background of the normal processes of childhood development. This allows him to point out normal variations in behaviour and common problems associated with different phases of development. Next the causes of childhood psychiatric disorders are discussed under three headings—constitutional factors, the effects of physical disease and injuries, and environmental factors. A particularly useful chapter on the psychiatric assessment of children follows.

The remaining chapters are devoted to particular problem areas, such as neurosis, psychosis, conduct disorders, developmental and habit disorders, the effect of brain damage, and psychosomatic disorders, educational problems and problems of adolescence (including a useful account of the drug problem). There is also a chapter on treatment and prevention of these problems and a particularly worthwhile section on psychological testing.

The book is surprisingly comprehensive considering its length, therefore it appears carping to be critical about omissions or the thin treatment of particular topics. I will take this risk by saying that an already excellent text could have given an even more rounded picture of child psychiatry to the student (and that other audience that is mentioned, namely social workers, child care workers and teachers) if more had been said about learning and its role in psychological disorders. This would have required a slightly fuller treatment of behaviour therapy and its uses in child psychiatry. These issues loom larger in child psychiatric practice than would be suggested by the book. Having said this I would strongly recommend this book to medical and nursing students as well as professional groups, like social workers who have to deal with disturbed children.

MARTIN HERBERT.

BERNARD, H. W. (1971). *Adolescent Development*. Scranton, Toronto, London : Intext Educational Publishers, pp. 510, no price stated.

In 1957, Harold Bernard, who is a professor in the Division of Continuing Education of Oregon State System of Higher Education, published his *Adolescent Development in American Culture* which was addressed to parents and teachers. The book under review is in effect a rewriting of this earlier work to incorporate the research findings of the last 15 years. There is no direct reference to American culture in the new title, but the text deals almost exclusively with adolescents in the USA. It is not surprising, therefore, that although there is a comprehensive bibliography running to nearly 40 pages, reference to British work is virtually absent, being confined to six authors : Eysenck's *Handbook of Abnormal Psychology* (1961), Huxley's *Evolution in Action* (1953), Musgrove's *Youth and the Social Order* (1965), Tanner's *The Course of Children's Growth* (1963), two articles by Ethel Venables, including her contribution to this *Journal* on " Changes in Intelligence Test Scores of Engineering Apprentices " (1961), and an article by Harold Loukes in *Phi Delta Kappan* (1964). Nevertheless, much of what it contains is relevant to British adolescents and will be useful to students in training, and teachers.

The book is a competent summary of present knowledge concerning adolescence in the USA, viewed as a psycho-socio-cultural phenomenon. It is divided into four parts. Part I concerns itself with basic considerations: principles of development, developmental tasks of adolescence, adolescence as a cultural phenomenon. Part II deals with particular aspects: physical, intellectual, emotional factors, socialisation, including heterosexual adjustment, moral values, adolescent interests. Though brief, many sections here give excellent summaries, e.g., intellectual development, adolescent interests. Part III deals with institutional factors: the home, social status, the school. Part IV covers the transition into adulthood, including marriage, work, citizenship.

Case studies have been sparingly used, which is, in the reviewer's opinion, an advantage, as too often students may deduce unwarranted conclusions from unique cases. Complete coverage of research is not attempted, although there are no fewer than 500 references in the text. Familiar data on early marriage, vocational training, and career selection have been given a somewhat unusual interpretation.

In summary, a good book for students and teachers covering a wide field, but of limited use in Great Britain owing to being confined almost entirely to the American scene.

Finally, there is space for two quotations which highlight two topical themes of the study of adolescent development:

(1) " Today's young people are role-oriented. They must *be* someone rather than *get* somewhere. They are people-oriented rather than job-oriented " (p. vi of the Preface);

(2) " Studies of the career patterns of adult workers have several important implications for the future of the adolescent. It was found that the adult worker holds from one to eleven jobs before he settles down in one he considers his regular work. The typical worker will make six or seven job changes in his life " (McGully, 1969, p. 65).

JOHN G. LANG.

BOYLE, D. G. (1971). *Language and Thinking in Human Development.* London: Hutchinson Co., Ltd., pp. 191, £2·25.

In a comparatively short book the author has attempted to treat a topic that is covered by a vast range of biological, linguistic, philosophical and psychological works. He makes it clear in the preface that his intention is to aid the student reader who might easily become lost in the literature. There are, of course, more ways than one of doing this, and Dr. Boyle has chosen to centre his on the theme of symbolic activity; first discussing language and imagery, then language and thinking, and, in a final section, philosophical aspects of problems of language and thought. It is evident, however, that in two respects the treatment somewhat belies the title The emphasis is much more heavily on thinking than on language, and the focus is on what characterises the human condition more than on processes in ontogenetic or phylogenetic development. Pursuing his declared aim the author discusses a variety of theoretical and experimental approaches rather than attempting to develop some particular argument or theory, though his appreciation of Piaget's work is very evident. The book is thus like a collection of readings integrated by their common authorship and overall arrangement.

In general the chapters are short and readable, clear in presentation of theoretical aspects, and furnished with examples of experimental work. Students will undoubtedly appreciate this, but sometimes economy seems to be taken a little too far. Discussion of image and symbol might benefit from reference to Locke and Titchener, and conceptualising from Quine's notion of ' semantic ascent,' while it is surprising that fuller use is not made of Piaget's work in the chapter on symbolism and play. More seriously, although reference is made to planning, this aspect of the organisation of thought and of language is almost totally neglected. Further, to dismiss the relation between meaning and grammatical structure as a controversy in linguistics rather than psychology (p. 35) is to omit its most interesting aspect, namely that judgment and coding are involved in the learning and use of language, and these involve decisions about language data. This, surely, is central to the psychology of thought and language. It is perhaps because of this neglect that treatment of language is thin compared with that of thought. Apart from philosophical publications only about 5 per cent of the listed references are to work on language.

In spite of these criticisms, two things must be said warmly. First, the chapters on reasoning and conceptualising, and in particular that on intelligence and creativity, are very good. The last shows best Dr. Boyle's knack of displaying an extensive grasp of a topic concisely and clearly with a wealth of cogent criticism. Second, throughout the book one gains glimpses of the author's mind and recognises his deep concern with two very important issues—methodology in psychology and values in education.

HAZEL FRANCIS.

BUROS, O. K. (Ed.) (1972). *The Seventh Mental Measurements Yearbook.* New Jersey: Gryphon Press, pp. 1985, (two volumes), $55 plus postage.
ALSO: Re-issues of *The* 1938 *Mental Measurements Yearbook,* $15. *The* 1940 *Mental Measurements Yearbook.* $17·50.

The preface to this seventh edition of a standard reference work on tests provides surprising information to the effect that the Gryphon Press consists of Buros and his wife. The work of producing both the *Mental Measurements Yearbooks* (MMY) and *Tests in Print* (TIP) is carried out by the editor and his wife, a practice which began with the 1940 edition, although Rutgers University, from which Buros has now retired, did produce two of the earlier works in the series. In 1973, there will be a second TIP and in 1975 it is hoped to produce an eighth MMY. After that someone else, whether individual or institution, will carry the burden. This is of interest because it is a mammoth task for two people, even allowing for editorial assistance and assistance from many outsiders. Finance has come from the sale of the product. It is an indication of the price of independence. The better mouse trap principle has, of course, operated and test constructors, editors of learned journals and reviewers have all been happy to be associated with the work.

The objectives of all MMYs are very precise, to provide information on, and high quality evaluation of tests, by authoritative individuals and to provide extensive references and indicate sources of books on testing with the evaluative reviews of such books from the learned journals. Inevitably the authors have become crusaders for better tests with better background information to enable users to be better users who will also make a greater qualitative demand on test constructors. Like many other missionaries they have been frustrated, but in their case because of the gullibility of test users who will buy anything which is well-packaged and promoted, regardless of its inadequacies as a test and of claims for it which cannot be substantiated. Perhaps a measure of sympathy could be extended to teachers, educationists and psychologists desperately searching for instruments—however crude. An appropriate text for wall display is a quotation from Buros, "At least half of the tests currently on the market should never have been published."

Few individuals will purchase this MMY, the first one to be produced in two volumes, partly because of the price and partly because of the system which interrelates all editions of the MMY and related monographs with obsessive thoroughness.

In effect each MMY is a supplement to its predecessors and should be used in conjunction with them. This determines that the series must be housed in an institution, but any institution serving individuals who are test users should hold the complete series. The young science of information retrieval would be critical of this system as it overwhelms even the most earnest seeker after truth by providing so much information. No concessions are made in presentation of information as in the commercial *Which* with its blobs for significance. Here you must read, and read—and read. Newcomers to this field would benefit greatly from a flow-chart.

The editors themselves are aware of the problem because in the area of tests of reading they have produced a comprehensive monograph (542 pp.) which brings together all the information on reading tests in the original six volumes. A similar service has been provided in a monograph on personality tests and reviews. Although there is some duplication and overlap in the system yet there is little chance of an institution purchasing expensive books and then finding that it has a rapidly dating product on its hands.

This seventh MMY is made up three-quarters of tests and reviews and one quarter of books and reviews of them and indexes (sic). The tests and reviews are the biggest ever with 546 tests and 798 reviews by 439 reviewers and over 12,000 references. The tests themselves are classified in 15 groups by test area of function not by type, e.g., Reading tests but not Diagnostic tests as a classification, the biggest single group being Vocations and the smallest Multi-Aptitude. Strangely enough, reading only makes fifth place. More than half of the tests are completely new to the MMY series. Criteria for selecting tests have been availability commercially in USA and, secondly, tests with a secure or semi-secure grading. A few tests published in Canada and England have been included.

Reviewers are carefully chosen by the editor and precisely briefed as to what is required. There is an adequate mix of new and old reviewers and a good age spread. Most reviewers deal with one or two tests and overwhelmingly they are Americans, but 24 are from UK. Inevitably shrinkage of intent has occurred on the part of the editor by failure to achieve commitment on the part of some reviewers, a phenomenon known to most editors. The biggest growth area since the sixth MMY has been in references to literature published on tests in the English language and world wide with a 55 per cent increase here. In alphabet soup terms MMPI exceeds ITPA for references by a factor of 8 and Rorschach exceeds WAIS by a factor of 2. These have been selected as being in common usage in UK.

There is much new material on reviews of books on testing published in the last eight years in 86 journals and a striking feature is that 55 per cent of the books had no reviews worth excerpting from the journals. The problem then becomes one of determining whether the lack of a good review—or any review—is a criterion for the reader in choosing a book.

The final section provides comprehensive indexes for periodicals, publishers of tests and test titles and names. With the mania for classification and analysis which characterises the book we are told *inter alia* that of the 99 journals agreeing to excerpting of reviews there are 16 British ones. This *Journal* is the most commonly used of these.

Regarding publishers the situation is similar to that in Britain where there is a network inter-relationship of big companies. What is surprising is that there are so many small publishers producing just one test.

For the first time book titles appear separately. The index of tests and reviews in a work like this is crucial. Above all there must be ease of reference and immediate main criteria which will eliminate quickly what is not required. The pattern of presentation of information must remain the same so that the user learns a drill easily. One is dependent on the authors for wide coverage and accurate description and comment. If anything, this trawl has netted a number of test fish which should be put back in the water rather than allowed any big ones to get away.

Most test users in Britain want information on tests in a fixed order—what does it do? What age range? How long does it take to administer? What is the cost? How available is it? Are the norms up to date? Regrettably the question of standardisation and validation is lower on their list and few bother about copyright.

All this information and more is available plus some key critical comments on some tests, e.g., " No Norms ! " A star and an asterisk indicate new tests and refurbished tests in MMY terms. An elementary knowledge of Greek will enable the reader to differentiate quickly. Failing that, reification will work.

Let us try to follow a test through as a user. We need a test for 10-year-olds in reading which can be completed in about 60 minutes, is group administered, machine scoreable, cheap, readily available and which essentially provides achievement levels with some indication of types of weaknesses in the pupils which could be pursued further.

Check the classified index of tests. It is sub-headed—diagnostic, miscellaneous, oral, readiness, special fields, study skills. Eliminate readiness, special fields, oral and miscellaneous in that order and you are left with half the tests including the initial, unclassified group. Query diagnostic and study skills eliminating most tests. Return to the general list and pick " Comprehensive Tests of Basic Skills : Reading." Note that it is new by the star and check its page number.

It has four grades, one suitable for you ; it takes 52 minutes for pupils but 75 minutes from start to finish including administration. It is machine scored but do you know what Scoreze and CompuScan answer sheets are and have you access to Digitek ?

You then read the single review from the University of Kentucky, keeping a tight rein on your prejudices. It tells you that recognition, translation, interpretation and analysis are covered but " higher mental processes " excluded. Your negative swing is countered by the information that its classification is adapted from Bloom's *Taxonomy* and that results correlate above +0·82 with California Achievement tests so that these higher mental processes cannot be wholly excluded. There is doubt about the sub-test diagnostic function but there is high praise for test construction, content validity and the fact that there are four types of derived score.

You are then guided to two reviews and three excerpts in the other volume (it would help if the same bold-face type was used for each guide figure, in this case 9) which are broadly favourable and guided on to four other reviews of sub-tests. You then have to check Digitek and CompuScan, but not here.

Only the most disciplined mind will ensure maintenance of original objective and eschew side-tracking as names and challenging statements catch the eye while going through the pages. The incidental learning is enormous. A useful bonus is the address lists provided by the contributing test reviewers and the index of periodicals.

A brief overall evaluation would be sheer presumption but as R. H. Tawney said of the pillar-box, regarding communication in another era, so it can be said of this volume, " It is necessary."

An interesting feature of this whole publishing venture in MMYs is that the 1938 and the 1940 MMYs have just been re-issued. They indicate growth rates in this field by comparisons but also are useful source-books for contemporary reviews, i.e., what was thought about the 1937 Stanford-Binet revision at the time. Half of the book is given up to reviews of books on mental measurement, research and statistics, some of which have become classics

The 1940 MMY shows the precise direction of growth in giving more space to reviewers, encouraging more trenchant criticism and decisions on supplementary publication. The strong reactions of publishers and test authors to unfavourable reviews make fascinating reading as excerpted in the introduction. The other big change is in the ratio of test reviews to book reviews. Not all changes are in the form of increased growth. The periodical directory and index for the 1972 edition of MMY is smaller than that of the 1940 edition One can see much more rigorous selection operating but in a period when the proliferation of scientific and learned journals has become a doomwatch phenomenon this is a move against the trend.

A niggling doubt remains. What will happen to this massive collection of tests, books, journals and contacts when the Buros team cries, " Hold : enough " ?

J. G. Morris.

BURROUGHS, G. E. R. (1971). *Design and Analysis in Educational Research.* Educational Monograph No. 8, University of Birmingham School of Education, pp. xii+327, £2·00.

Professor Burrough's purpose in writing this book, so he tells us, was " to meet the needs, as I saw them, of . . . those teachers who . . . had returned to the university to undertake an intensive one-year course of study in education " (p. vii). Its central theme is that of experimental design in educational research. In particular, it deals with the collection and tabulation of data, with sampling and hypothesis-testing, and with the drawing of conclusions and the writing of reports. Accounts are given of the more commonly used statistical techniques (those involving calculation of t, r, chi-squared, etc.), and there is discussion at an elementary level of factorial analysis and analysis of variance.

I have met few books on statistics which are so refreshingly free from formidable jargon. The style is lucid, relatively complex notions of experimental design are explained with the minimum of fuss; the advice is sound and sensible; the examples are always telling, and there are some delightful touches of humour. In all these ways the book seems to me excellent.

I cannot help wondering, however, if research of the sort envisaged here has all that promising a future. Professor Burroughs is under no illusions about its limitations. But he still speaks as though answers to questionnaires and scores on tests alleged to measure attainment, personality and intelligence are the raw material of educational research. My own feeling is that we should be better off if we took more seriously the concepts of ' base-line ' and ' steady state.' Only if we know our subject's base-line (i.e., know what he is consistently doing before the experimental variables are introduced) will it be possible to isolate the effects of such variables; and in the teaching of complex skills, such as the abilities popularly grouped under the term 'intelligence,' it seems to me that our first task should be to try to establish steady-state (i.e., consistent) responding on the component parts separately, and that we should increase the complexity only gradually; otherwise we are led inevitably to the defeatist conclusion that certain reasoning skills are ' too difficult.' If research workers in education stopped collecting and correlating test scores, IQs, etc., and instead studied changes in behaviour in individual subjects in response to systematic variations in the stimulus-conditions, the results might well be more exciting than those achieved by traditional methods. Of its kind, Professor Burrough's book is excellent. My one worry is that he may be giving too much encouragement to the wrong sort of research.

T. R. MILES.

CHRISTMAN, R. J. (1971). *Sensory Experience.* London: Intext, pp. 408, cloth £4·50, paper £3·00.

One of the most exciting developments in the study of perception has been the way in which the results of neurophysiological research can explain many of the psychological aspects of perception. It is therefore very disappointing to read a book which ignores most of this research and tries to explain perception purely in terms of sensory mechanisms, omitting the contributions from the complexes of nerve cells leading from the senses to the brain and the sensory areas of the cerebral cortex. It is not surprising, for example, that Dr. Christman finds the after-effect of movement difficult to explain when he makes no mention of the nerve cells in the visual cortex which respond to movement in a particular direction.

In spite of this major general omission, the book is still quite useful in giving a clear, readable and fairly well illustrated account of the senses and the psychological, but not physiological, methods used in their study. It is aimed at the non-specialist student, and manages to cover a wide variety of topics relevant to the senses, including evolutionary development, anatomy of the senses, the physical properties of stimuli, types of measuring instrument, psychophysics and psychophysical methods. Some topics are so superficially dealt with that they could well have been omitted, and in general a more concise selective account would probably have been more useful. For example, the sections on information theory and computers are much too brief to be useful, and these topics are not mentioned at all in the main part of the book.

Most aspects of the senses are covered fairly adequately, within the limitations mentioned above, but some sections of the book are not well organised and would be confusing for a non-specialist reader. The chapter on colour vision, for example, is particularly lacking in clarity. Although some of the relevant physiological evidence is mentioned, there is no diagram of the spectral sensitivity of different cone pigments or of the probable organisation of colour vision into successive component and opponent processes. Without this the discussion of theories of colour vision is very vague and based mainly on inconclusive evidence. The use of chromaticity diagrams also seems unnecessarily complex for a book of this level.

There is certainly a need for up-to-date book for the general reader covering the psychological and physiological aspects of perception. Unfortunately, this book has too many inadequacies to be able to meet this need.

ANDREW GREGORY.

GREENING, T. C. (Ed.) (1971). *Existential Humanistic Psychology.* Belmont, Calif.: Brooks/Cole and London: Prentice-Hall, pp. viii+199, £2·25.

Based on a series of lectures presented by the University of California Extension, Los Angeles, in 1969, this book consists of nine essays, each the work of a different contributor, together with a preface, introduction and postscipt by the editor. He tells us that it " is not intended as a systematic survey of the broad field of contemporary existential and humanistic psychology. Instead, it is a collection of individual statements by writers who view existential and humanistic psychology from the specialised vantage points of their own work and thought." It thus includes not only contributions from three psychologists, all of them well-known advocates of humanistic psychology, Charlotte Buhler, Floyd Matson and James Bugental, but also from an educationalist, a lawyer, a professor of romance languages and two philosophers, one of whom is a Jesuit priest and an expert on Heidegger. The editor, a practising psychotherapist, also contributes a chapter on encounter groups.

It is doubtful whether this book will prove of value to those not already converted to a belief in the worth of the existential-humanistic sort of approach to psychology. Such heathen psychologists will certainly find much of the language used by these authors opaque and perplexing, in particular the attempts by Richardson and Peyre to expound existentialist thinking in, respectively, Heidegger and modern French literature. It may be, as the latter author asserts when trying to explain Sartre's thinking, that " Man, the being for itself, is the only being that has no essence," and that "Man is the only being in whom, chronologically and ontologically, existence precedes essence," but it is difficult for most of us to make sense of such statements. Similarly, the sorts of question existential-humanistic psychologists commonly seek to answer—" What does it mean to be fully human ? " " Where shall we look for meaning and purposes ? " and " How shall we treat each other ? " are examples given by the editor in his introduction—are likely to be thought by the unconverted to be illegitimate questions for the psychologist, *qua* psychologist, to attempt to answer. Finally, the shrillness, the exaggeration, the over-simplification often to be found in this book are qualities which most conventional psychologists will find particularly unattractive. For example, there is indeed a case to be argued against behaviourism as a philosophy underlying psychology, but that case is not helped by Matson's noisy and simplistic assault on (what turns out principally to be Watsonian) behaviourism. Again, it can certainly be argued that " behaviouristic, reductionist and mechanistic models of man " have their limitations, but it is false and dogmatic to say, as does Iyer, one of the philosophers, that such models " are undeniably and invariably dull and unexciting."

All of this is a pity. For there is undoubtedly a need for a book which will explain—clearly and soberly—to ' main line ' psychologists the principles, methods and findings of existential-humanistic psychology. Unfortunately, this volume cannot be recommended as such a book.

G. W. PILKINGTON.

HARTUP, W. W. (Ed.) (1972). *The Young Child: Reviews of Research. Vol.* 2. Washington, D.C.: National Association for the Education of Young Children, pp. 374, no price stated.

This book follows upon Volume I, published in 1967, and consists of 16 ' mini-reviews ' which sample research performed mainly during the last five years. The research emphasises the behavioural development in infants and young children up to the age of 8 years and should be of interest to students, teachers and workers in disciplines allied to child development for content and range of strategies used by contemporary researchers in this field.

An introductory article about research stresses the desirability for researchers to define their goals rigorously with specificity and in observable terms to avoid some of the deficiencies of much earlier research which has been based rather upon philosophical cliches than upon accurate information. The criticism is made that far too often in the past over-generalisations have been made from data obtained under restricted laboratory conditions rather than under more naturalistic conditions. The plea is for researchers to relate their questions to real life issues leading to increased skill in studying and educating children.

An article reviewing the research on heredity and intelligence suggests that intelligence is most likely related to a reaction range of the genotype under environmental changes and that the only humane and rational enterprise for educationalists is to maximise the quality of environment for every human being.

In the review on attachment, the importance of reciprocal interpersonal behavioural reactions between mother and child is highlighted and is helpful in reminding us that terms such as warmth and nurturance must be described in more concrete and less value laden behavioural terms if we are to relate causally specific outcomes and particular conditions within the dyadic relationship.

Language development in " Children's Questions " is considered in terms of transformational grammar and the author states that an important aspect of the teacher's job is to listen carefully to how children talk and to encourage them to ask more productive questions which will enable them to gain skill in more complex thought processes.

Sigel in his review of the development of classificatory skills believes that they are necessary for the acquisition of a wide range of academic abilities and that training in classification can lead to more flexible and open behaviour. It would also seem that the ability to classify objects using multiple criteria enhances adaptability and intelligence manipulations.

Evidence is presented in an article on perceptual processes in reading in support of children learning phonics and in helping them to attend to differences among letters rather than to their shapes separately. There is a warning that devices such as colourful pictures illustrating objects in a text may distract the child's attention from the composition of words.

There are articles on the effects of mother-child interaction on cognitive development in children and also on parents as educators. Schaefer advocates major changes in professional roles and responsibilities in training, and in educational policies and programmes, to achieve a goal of equal education in the home as well as in the school.

A review of some effects of punishment on children's behaviour reveals how varied and dependent effects are upon timing, intensity, consistency, affectional ties, status, and cognitive structuring of the recipient and reminds us how very complex human behaviour is and how hestitant we should be in making over-generalisations and dogmatic statements.

The articles toward the end of the volume deal with aggression and social aspects of child development which should be of particular interest for teachers.

This collection of reviews on the development of young children fulfils its purpose in presenting a sample of researches " balanced in topic, contemporary in theoretical approaches, and eclectic with respect to method." It not only reveals how important it is to research in the naturalistic field to supplement extrapolations from structured laboratory experimentation, but also the necessity for a multivariate approach. One cannot help but be impressed when reading about such varied research topics and design strategies orientated toward the goal of precision in predicting individual behaviour, but at the same time one possibly wonders, in view of the ever increasing number of variables which are discovered related to any particular human act, whether prediction will always have to be statistical and in terms of probability because of the uniqueness of that act.

R. HARRIS.

HOOPER, R. (Ed.) (1971). *The Curriculum: Context, Design and Development.* Edinburgh: Oliver and Boyd in association with the Open University Press, pp. 505, £1·25.

This book of readings has been prepared by members of an Open University course team and forms part of a second-level course in the Faculty of Educational Studies. An interdisciplinary approach has been taken to the study of curriculum with contributions by historians, sociologists, psychologists, philosophers, curriculum designers and educational technologists. The book is a 500-page paperback, containing a set of 37 readings drawn from a wide variety of sources, together with introductions to each of the three sections. Each reading is also prefaced by a short summary of its contents.

The readings have been chosen from books and journals published, with a few exceptions, in the 1960s and 1970s; about half were written with the English educational system as background, about a third from the United States angle, and most of the remainder are more general in character. Most, though not all which should, provide useful references for the reader who wishes to pursue further the topics discussed.

The lengths of the articles range from four to 25 pages, the originals having in some cases been abbreviated, but what is more important is the range in viewpoint. The articles naturally vary in quality; conclusions are sometimes based on very slender evidence, e.g., a sample of one school to represent a country; in a few it is the voice of the prophet that is heard rather than that of the scholar, but it is all very bracing.

The first section is concerned with the context of the curriculum and several authors remind the reader that many educational systems are based on a history of social distinctions. Some of the curricular developments seem likely to strengthen rather than weaken the divisions, academic courses remaining unaffected, while those for average and under-average children go off on a different track. This section concludes with an article by an author who would do away with schools, colleges and universities as they stand, and allow young people to learn only what they want to know.

The second section, dealing with design, is the longest in the book and contains several papers with a theoretical basis. The curriculum is defined here as more than the subject matter or content; it is objectives plus content plus methods plus evaluation, each reacting on the other. Some of the authors are frankly pessimistic about present developments ; a coherent theoretical framework for guiding curricular design is lacking, claims made by teachers are often found wanting, and subjects seem so firmly entrenched that changes are difficult to make. The contributors differ in their assessment of objectives, some wishing mathematics, human and physical sciences, philosophy, morals as well as art and literature to be compulsory for all; others are convinced that for the bottom 30 per cent abstract thought is out.

The final section, on the development of the curriculum, is easier going and consists mainly of descriptions of developments in England, Scotland and the USA. There is a fear that changes have been been too piecemeal and that what is required "far-sighted long-term planning which would give the curriculum some kind of logical structure and unity." A study of the readings of this book would make an excellent introduction to the thinking which must precede this planning.

David A. Walker.

Jones, N. B. (Ed.) (1972). *Ethological Studies of Child Behaviour.* London: Cambridge University Press, pp. x+400, £7·00.

Ethology is an approach to the study of animal behaviour which has its roots in Continental zoology rather than Anglo-American comparative psychology. Ethologists have developed methods of detailed description of specific motor pattern; this is a necessary initial stage in attempting to understand the immediate causes, development and survival value of behaviour. In recent years this ethological approach has begun to make an impact on psychology, and especially the study of child behaviour. This has resulted in research endeavour which, although not radically different from the more traditional work in the field of developmental psychology, has nevertheless, a certain distinctive flavour of its own. The present collection of papers illustrates well these new trends in child psychology.

Apart from a helpful introduction by the editor, the book is divided into three sections, as follows: (1) five papers on child-child interactions, (2) four papers on mother-child interactions, and (3) three papers on comparative studies. Some authors, such as Dr. Blurton Jones and Professor Connolly, have contributed to more than one section. It is clear that much effort has gone into the description and enumeration of activities of pre-school children. This has been followed by factor-analyses of the resulting data. It remains to be seen how worthwhile the various findings will be in increasing our understanding of the behaviour of young children.

On the other hand, all this painstaking factual research is in the best ethological tradition, and contrasts very favourably with the loose ethological writing about human nature which has been so popular in recent years. In fact, some of the contributors are sharply critical of some eminent research workers who have at times indulged in popular human ethology which is not rooted in careful factual knowledge.

The present reviewer has personally found the comparative studies section to be of the greatest interest in the book, even if one paper claims to be no more than a preliminary report of a study of infancy and early childhood in an African hunter-gatherer people, and another claims to be merely surveying evidence supporting the view that human mother-and-baby behaviour is like that of other mammals in which the young feed more or less continuously. Personal predilections aside, this book presents a fresh approach to child psychology, and one which will well supplement and enrich, rather than supplant, the existing forms of research activity in this field.

W. SLUCKIN.

KLINE, P. (1972). *Fact and Fantasy in Freudian Theory*. London : Methuen, pp. x+406, £5.

In clinical and educational practice passions still run high, as Freud predicted they would, ' for ' or ' against ' psychoanalysis ; and academic psychology tries to pretend for the most part that it does not exist (perhaps the most passionate reaction of all). Ought we not to know by now, however, whether, or to what extent, psychoanalysis is true or false, so that these passions can be put in their place? Eysenck has assured us, of course, that it cannot be true in any respectable scientific sense (and there is no other respectable sense for him), because the business suffers from the defect of being essentially ' unscientific.' On the other hand, only four years after Freud's death, Sears was able to review a number of ' objective ' studies of individual psychoanalytic concepts; and Eysenck himself could later (1963) comment that the upshot of such studies was roughly that for each psychoanalytic hypothesis supported, some two had been left dubious or refuted—which he conceded to be " by no means a bad average as scientific hypotheses go."

Dr. Kline's admirable book, which is well-produced and well-indexed, goes a great deal further than this. At the very outset, for example, he is sensitive to important niceties of procedure which have often escaped previous axe-grinding critics. Although he is concerned with the broad question of what is the objective, independent, quasi-experimental ' evidence ' for Freudian theory, he realises that you will go astray if you do not initially clarify two basic epistemological issues. First, you must know what kind of theoretical animal you are dealing with ; second, you must understand that a factual observation may provide evidential support for a theoretical proposition in a variety of ways, the rationale of those ways not being as cut-and-dried as Popperian positivism used to declare.

On the first point, Kline adopts Farrell's view that psychoanalytic doctrine is a ' premature synthesis ' of more-or-less diverse and mutually independent hypotheses: diverse, because they propose different *sorts* of thing, e.g., that paranoia expresses repressed homosexuality, that there is a defence of ' projection,' that the ' id ' is the reservoir of instinctual energy and operates on ' primary process ' principles ; mutually independent, because some of these hypotheses are unconnected logically or empirically with some others, so that some parts of the story may be true while others are false or nonsensical. In these respects, Freudian theory differs importantly from tightly-knit scientific paradigms like the special theory of relativity. Further, the nature of this internal diversity is such that different kinds of observational evidence will be relevant to different aspects of the ' theory ', and even that observations (or, strictly, propositions about observations) will impinge upon different elements of the theoretical ' synthesis ' in logically different ways, for example, in various ways *other* than by fulfilling some prediction necessarily entailed by a combination of hypothesis and particular circumstance.

On the second issue, Kline is prepared to take a bold line, in the sense that he waives considerations of alternative modes of validation for Freudian hypotheses and entertains, for the sake of argument, a simplistic (and some would say misleadingly naive) hypothetico-deductive criterion. That is to say, he assumes that Freudian theory, or some parts of it, can be put to empirical test in the manner supposedly typical of established sciences like physics, chemistry, mechanics or astronomy : namely, by drawing out particular hypotheses and setting up particular conditions such that particular consequential observations would be made in those conditions if and only if the required hypotheses were true. It is notoriously difficult, of course, to pin down psychoanalysis to specific hypotheses and specific observational implications, but Kline rightly argues that it should be (and in fact is) possible to establish a minimal core of concrete assertion and implied prediction, in the absence of which psychoanalysis would indeed be no more than the naked emperor of Eysenckian burlesque.

Accordingly, Kline sets out a number of piecemeal hypotheses to which, at least, Freudian theory (or parts of it) seems to be committed if it has any empirical ' cash-value ' at all. They are derived largely from Freud's original writings and from the canon of Fenichel (1945), and are grouped under various topics or aspects of the theory. Thus, there are sections on the existence of psycho-sexual personality syndromes (e.g., is there such a thing as an ' oral character ' ?), the aetiology of such syndromes (e.g., if there is, does it develop from infantile experience in the way Freud suggests ?), the Oedipus/castration complex, mental structure, dream-theory, defence mechanisms and the effects of analytic therapy. The results of some 600 studies are then brought to bear on these hypotheses, and examined to see whether they support, refute, are equivocal or are irrelevant. Conclusions are usefully summarised at ends of chapters. The studies consulted range widely, taking in observations from Ghana, Israel and Japan—a far cry from the myth of middle-class Viennese neurotics ; and they are examined closely, with Kline taking up highly technical points of experimental design and statistical treatments when necessary.

One gets the impression that Kline is sympathetic, but hard-headed and very far from indoctrinated. Inevitably, the book reads a bit like a catalogue : sometimes we are not told enough about how a concrete hypothesis is derived from the ' theory ' (e.g., the relation between dreams, anxiety and REMs in chapter 9), and the discussion is not always as rich and penetrating as the research data warrant ; but if it had been, almost every chapter would have emerged at short-book length. (Perhaps they should have done, because one would like very much to see an amalgam of these empirical digests with the doctrinaire Hampstead Clinic monographs on psychoanalytic concepts.) Kline's balanced approach is typified by his comments on the efficacy of psychotherapeutic techniques derived from various forms of ' learning theory.' That a spider-phobia can be eliminated by juggling with reciprocal inhibition (toy spiders and cups of tea), or with discriminative stimuli and schedules of reinforcement (toy spiders and cups of tea), tells you nothing about the origin of such phobias. Reinforcement theories and techniques are often concerned with *what* events are reinforcers without asking *why* they are reinforcing—or rather, why they have become secondarily reinforcing. But that is the question that Freudian aetiology is about ; and Freudian therapy, whose principles and results are only loosely connected with the explanatory theory (as Dalbiez argued in his classic review of 1941) may, indeed, be relatively inefficient. So Kline is content to see the technology of behaviour therapy/modification as complementary, not antagonistic, to Freudian dynamic theory.

What then is the final score ? Well, this is far too serious, subtle and many-sided an investigation to be trivialised in a crude ' for or against ' way. Perhaps it is more a matter of Freudian theory emerging ' bloody but unbowed ' from a gruelling grilling. What is important is that the grilling has been done calmly, minutely, informedly and perceptively, and that anyone who opens his mouth or takes up his pen on the subject of psychoanalysis should have read this laudable book.

NEIL M. CHESHIRE.

LYTTON, H. (1971). *Creativity and Education.* London : Routledge and Kegan Paul, pp. 133, £1·30.

The stated purpose of this book is to give an understanding of the issues that teaching creative children, and teaching children to be creative, raises for education. It also attempts to clarify how far research has taken us in exploring the relationships between convergent and divergent thinking, and to show what it can tell us about the kind of individual the creative person is, and the sort of environment that helps him to grow. This is a tall order from an area aptly described by Morris in the introduction, as one in which there has been much loose thinking, and a good deal of trivial research.

Chapter 1 is concerned with the philosophical background of the creative process and particularly stresses the theories of Bartlett, Wallas and Koestler. Chapter 2 concentrates on convergent and divergent thinking, and includes sections on Guilford's structure of intellect model, the relationship of convergent and divergent thinking, and the validity of divergent thinking tests as indicators of creativity. Contrasting chapters 1 and 2 clearly demonstrates the tenuous link between theory and practice in this area. The author makes this explicit by pointing out that psychologists have indulged in a sleight of hand, by concentrating on small segments of behaviour which are, above all, measurable. " Tests of creativity can be seen to be but poor, trivial fragments of what they are trying to measure." On the question of validity Lytton concludes that " the evidence, such as it exists . . . is not very strong." Despite this, Lytton shows a certain ambivalence in his attitudes towards the distinction between these two constructs, since in the face of such evidence he continues to equate divergent thinking with creativity. Thus, in chapter 3, which concerns the effective aspects of creativity, we are told that the only way to delineate creative adolescents is by high scores on divergent thinking tests.

The penultimate and final chapters contain overviews of the environmental influences operating in the development of creativity, at home and at school. Of all the chapters these are probably the most speculative, simply because of lack of adequate research. The author is, therefore, obliged to draw heavily on the work of Getzels and Jackson and Hudson, none of which particularly inspire confidence.

Each chapter of the book provides a useful, if rather elementary, review of relevant literature, and should be useful for the beginning student or teacher who is not too concerned with the underlying theoretical issues. The book, therefore, fulfils its stated purpose within the limitations imposed by the literature available. Unfortunately, it also epitomises the schizophrenic thinking typical in this field of research. Throughout the book it is constantly claimed that divergent tests cannot be regarded as indicative of real life creativity and yet, throughout the book, they are treated as synonymous. Such confusion underlines the pressing need for research into the criterion problem.

NEVILLE BENNETT.

MOSER, C. A., and KALTON, G. (1971). *Survey Methods in Social Investigation.* London : Heinemann Educational Books, pp. 549, £1·75.

This is the second edition of the widely used textbook which was first published in 1958, under the authorship of Professor Moser. The text has been considerably expanded, as has the bibliography which has also been revised, the changes reflecting the increasing rigour of survey methods.

The introductory chapter has been re-written and expanded to include more examples of surveys and several additions have been made throughout the book.

There is a new chapter on " Experiments and Investigations "—that is, the use of surveys to investigate causal relationships rather than for descriptive purposes—and this is matched by an expansion of the discussion of interpreting relationships and the addition of a section on causal models in the chapter on analysis and presentation of results.

In keeping with the increasing rigour of sampling techniques there are now two chapters on sample design and more examples have been given. One rather unfortunate effect of this increase in sophistication both of sampling and of statistical methods of analysis is that the more difficult parts are now in smaller print. This may make them easy to identify but it makes them more difficult to read.

The discussion of scaling methods has been enlarged to a full chapter and gives a more detailed description than in the first edition of types of scales including Likert and Guttman scales and the use of the Semantic Differential. The chapter on data processing now includes a section on the use of computers in analysis. This could profitably have been expanded as access to computing facilities is becoming more widespread ; more guidance on their use and avoidance of misuse would have been welcome.

As did the first edition, this takes the intending investigator through all the stages of a survey from planning to presentation of results. (The penultimate chapter includes a revised version of the United Nations recommendations for the preparation of reports.) However, it shows most clearly that the elaboration of techniques of sampling and of analysing the data have far outstripped in sophistication the methods of data collecting such as tests and questionnaires. Further, the authors are careful to point to the errors that can arise in responses to questionnaires through, for example, badly framed questions, inadequate interviewing and non-response. Careful reading will show how concerned the authors are that over-elaborate techniques of analysis should not be used on inadequate data, although one would feel happier if this were even more heavily underlined. The gap in sophistication between the statistical techniques and methods of data collecting shows no sign of decreasing, while the numbers of surveys are increasing.

This edition should prove as valuable as the first edition and is, in contrast to many survey reports, also interesting to read.

JENNIFER STEWART.

OBER, R. L., BENTLEY, E. L., and MILLER, E. (1971). *Systematic Observation of Teaching, An Interaction Analysis—Instructional Strategy Approach.* Englewood Cliffs : Prentice-Hall, Inc., pp. 236, £4·15.

Systematic observational methods, most commonly used by classroom researchers and by teacher-trainers, have been strongly associated with the move to identify and to train for process-criteria of teacher effectiveness. Within current teacher-training programmes, such as microteaching procedures and courses in interaction analysis, an observation schedule may be applied to recorded sequences of teaching and used as a form of feedback to the trainee. Within some such programmes trainees use observation schedules to analyse and code their own teaching behaviour for the purposes of self-critique. But even such self-critique procedures make reference to various (often disputed) criteria which are specified by the trainer, rather than by the trainee himself.

Ober's book is directed to teachers and offers systematic observation for their use as a self-assessment device. But his suggested self-critique procedure differs from many others in having, as its criterion, the teacher's own intent. His schemes, to be applied by the teacher himself, to self-recorded sequences occuring in his own classroom, are " for obtaining data that can be used to compare action with intent—what actually happens in classrooms with objectives." Self-selected objectives, or criteria of performance, rather than assumed general criteria of teacher effectivness, are stressed.

Two observation systems are offered, the Reciprocal Category System to yield information on the socio-emotional aspects of recorded classroom interactions, and the Equivalent Talk Categories to describe the cognitive levels of such interactions. In both systems, the nine major categories identify both teacher and pupil behaviour, teacher-behaviour within a category being coded by a single digit, and pupil-behaviour within that category being coded by a double digit. This coding system is ingenious and discriminating, and minimises the load on the coder. The text also explains clearly how to compute reliability and how to present the obtained data in tables and matrices, and summarise them as percentages and ratios. The drawing of simple branching arrays is also described.

But the book has a number of shortcomings which make it difficult to commend to its intended readers. It seems, both from the preface, and from the text (e.g., Pupil : " I will do whatever is required," p. 50) that exemplary verbal interactions presented to illustrate rules for coding, are scripted rather than transcripted.) The book also makes a number of disputable assertions, for example, that the schemes it offers " make observation of cognitive activity possible " (p. 149), and that systematic self-observation by a teacher is a sufficient condition for effecting the desired changes in his behaviour (for example on page 19, "Awareness of the actual leads to control in strategy selections and implementation—a benefit of accurate feedback.") In many places, too, the text is linguistically unacceptable, either structurally or in other ways. Some observationists might, I suppose, tolerate constructions such as " Multidimensionality as a classroom phenomenon demands a multiplicity of assessment-modification approaches " (p. 137). But there are other statements, such that " It is difficult to observe unobserved behaviours " (p. 197) which simply seem, whatever one's frame of reference, nonsensical. These, and the errors in the bibliography, are to be regretted in a book which gives helpful advice to teachers on how to record, code and interpret behavioural data for their own use.

M. Cameron-Jones.

Packham, D., Cleary, A., and Mayes, T. (Eds.) (1971). *Aspects of Educational Technology, V.* London : Pitman, pp. 488, £4·50.
Davies, I. K., and Hartley, J. (Eds.) (1972). *Contributions to an Educational Technology.* London : Butterworths, pp. 294, £4·75.

These books are collections of short articles within the field of educational technology, broadly defined.

The first contains an edited set of papers given at the 1971 annual conference of the Association for Programmed Learning and Educational Technology, together with an introduction by Sir Brynmor Jones and an address by Lord Boyle. Apart from a miscellaneous section with papers on problems, techniques, trends and other general matters, it includes groups of papers on applications of educational technology in higher education (including symposia on the Open University and on medical education), in the school classroom, and in training (including the training of teachers). As the fifth volume of a series, it matches the earlier volumes very well. It gives an impression of a good lively conference with plenty of variety, although nothing very new was reported.

As editors of the second collection, Davies and Hartley have tried to present a representative set of papers each one of which makes a distinctive contribution to the field as a whole. The papers are grouped in sections concerned with theory, present-day techniques, applications, research problems, and evaluation, each section introduced by a brief discussion drawing the papers together and setting them into a context. In a sprawling field like this, in which articles are published in a great variety of journals, there is a continuing need for books of readings, although it is always difficult to justify one particular selection of papers rather than another. In this case the reader can at least be assured that the menu on offer has been chosen by experts whose work on the field goes back to its beginnings in this country. The coverage of subject matter is wide, there is no obvious bias in choice of authors and the editorial comments are helpful.

Both books provide useful reading for those who already know something about educational technology and wish to extend and refresh their knowledge. A beginner would be likely to find himself in difficulty through lacking the background knowledge that is taken for granted by some of the authors. Such is the diversity of topic and level of discourse that no one reader is likely to want to read through the entire contents of either book.

As would be expected, the conference papers are variable in quality and do not consistently match those that are contained in the contributions, but a number of them have a special interest as news items referring to work in progress. One criticism might be that several of the conference papers are not just up-to-date but beyond it, in the sense that their authors are reporting plans and intentions rather than anything that has actually been achieved. While 10 years ago this was common and forgivable in the excitement of trying out new methods, now it is tiresome to read half way through a paper only to find out that it is a plan for an investigation rather than the investigation itself. The editorial selection of papers for publication might well be more severe on future occasions.

What impression of the field as a whole is given by these two collections of papers? Negatively, simple and ordinary notions are still being dressed up with jargon and system diagrams while the exploration of important variables suffers neglect. More positively, the level of activity within the field is so high and the variety of approach so great that even crude techniques of assessment should guarantee the gradual evolution of improved methods of instruction.

R. L. REID.

PASSOW, A. H. (Ed.) (1970). *Deprivation and Disadvantage: Nature and Manifestations*. Hamburg: UNESCO Institute for Education, pp. 296, no price stated.

This volume contains nine papers submitted to a UNESCO symposium in Hamburg in October, 1967. The purpose of the meeting was "to examine the different forms of deprivation and disadvantage in the various regions of the world as well as the methods which have been used to mitigate their effects." The papers are preceded by an extremely well written and illuminating, but unfortunately anonymous, essay outlining the nature of deprivation and disadvantage in the countries concerned, together with brief details of research undertaken and projected. The author's plea for less demographic activity and more attempts to apply well established knowledge from a sound theoretical basis to particular problems is as valid now as it was in 1967.

The main meat of the volume is in the papers presented by nine of the participants describing the position in their seven home countries (England and Wales, Ireland, Israel, Scotland, United States of America and West Germany). In view of the international aims of the symposium it is unfortunate that the participants came from such a small bloc of countries. As several speakers claimed that their disadvantaged and deprived population was largely composed of immigrants one would have thought that a symposium of this nature would have provided a unique opportunity for host and parent countries to exchange views.

The student of comparative education will find interesting accounts of the differences in educational philosophies and organisation between the countries concerned. The composition of the main subject population varies from Orientals in Israel to female rural Catholics in West Germany, while the highly documented and researched state of the urban American negro contrasts with that of the Irish disadvantaged of whom no survey had, in 1967, been conducted. In view of this range of problems it is sad that over half of the volume deals exclusively with the American situation and American research programmes. The dangers of applying these findings uncritically to other cultures are obvious.

The main defect of the book is that the symposium was held in 1967 and, although some participants have clearly up-dated their contributions, there is no reference more recent than 1969. In a rapidly expanding field this means that the document is of chiefly historical interest. Thus, the American contributions pre-date the Westinghouse report, and the scholarly chapter by the Smilanskys contains but the seeds of their later work. All the participants are authorities in their field and the contributions are of a uniformly high quality. But the time lag between participation and publication means that the book can only be recommended as an introduction to a fast-changing field.

HELEN QUIGLEY.

PIAGET, J. (1971). *Science of Education and the Psychology of the Child.* London: Longmans, pp. 186, £1·60.

Undoubtedly, the first thing that must be said about this book is that it is not so much by the author of *The Psychology of Intelligence*, etc., as by Piaget, for many years director of the International Bureau of Education, and as such, closely involved with the work of UNESCO in the organisation of the Annual Conference of Public Education. This is not to deny that the two persons are the same, but to point out that the book does not set out to be a scientific treatise. Its principal aims are to give a broad picture of trends in education on a world scale during the period 1935-1965, and to indicate the most significant deficiencies.

The first chapter deals with developments in pedagogy. While paying tribute to the work of national research foundations, research institutes and the universities, Piaget insists on the importance of seeing education as a science in its own right, enjoying a similar relation to psychology and sociology as does medicine to physiology and biochemistry. He sees failure to advance in this direction as the main reason for the many gaps that still exist in our knowledge. The problem is partly an administrative one, linked to the relatively low status of the teaching profession and its relative lack of autonomy (with Britain a notable partial exception).

Chapter 2 entitled "Advances in child and adolescent psychology" is perhaps the weakest, because the most one-sided, since it focuses almost exclusively on the work of the Geneva School. The third chapter gives a bird's eye view of advances in curriculum development, with special reference to mathematics and science, but at the same time stressing the need for parallel development in the humanities. Here, as elsewhere, Piaget urges the importance of promoting the child's intellectual initiative and understanding, points to the dangers of didactic methods, even when used in conjunction with new curricula and materials. So too, in the following chapter he shows how new materials are often used simply as visual aids rather than as vehicles designed to foster thought and understanding.

While allowing the proven efficacy of programmed teaching methods, Piaget relegates their role to the teaching of facts. He recognises that the machine allows for the student to reason, but maintains that it cramps his initiative. It will be apparent that in these chapters Piaget is stating a point of view. Precisely because it is Piaget's own, it is of some interest—particularly as he is rarely given to pronouncements on the wider questions of education. Nevertheless, the section is brief, arguments are generally unsupported and the bias is apparent.

The remaining chapters deal with educational planning structural reform, especially in secondary education, the role of international collaboration, and the training of teachers. Together, they give a striking picture of the rapid expansion and diversification of education throughout the world in the mid-twentieth century, with illustrations drawn from both hemispheres and from socialist as well as capitalist countries. There is, however, a strong tendency to paint with a large brush, so exaggerating similarities and glossing over differences. Also it is a pity that this section does not include any analysis of the special problems of developing countries and how these are being tackled, e.g., in China, India and Cuba. In the last chapter, Piaget stresses the importance of teacher training, arguing that with every advance in educational theory the requirements of the teacher, and especially the elementary school teacher, are increased.

The volume also includes a short statement written in 1935 which is similar in content to Chapters 2 and 3 of the main work, and has similar limitations of bias and brevity.

While it can hardly be claimed that the book is a landmark, it will certainly be of interest both to the layman, wishing to get an overview of current developments in education, and to the scholar who wants to make sure what Piaget really thinks about education.

E. A. LUNZER.

PIAGET, J. (1971). *Structuralism.* London: Routledge and Kegan Paul, pp. 143, £2.

Piaget's opening sentence states " Structuralism is often said to be hard to define because it has taken too many different forms for a common denominator to be in evidence." After accompanying the author through alleged manifestations of ' structuralism ' in mathematics, logic, physics, biology, genetics, linguistics, anthropology, etc., not to mention psychology itself, all in the space of 143 pages, the reader may still be led to ask whether such a common denominator can really be said to exist. If it doesn't then most certainly Piaget's effort to distil it, or perhaps create it, with the erudition brought to bear in the process is still very much worth while.

One distinction which might be made between the leaders of European thinking and the ' English-American ' tradition is the predilection of the former for ' rationalism,' once the term for a somewhat derided ' arm-chair ' thinking, as opposed to empiricism, but more latterly as a belief, or, as Piaget says " an ideal (perhaps a hope) of intrinsic intelligibility," a faith common to structuralists. This does seem to entail what Edmund Leach has called a preference for generalised abstraction rather than empirical fact. It would, in fact, be difficult to find a more abstract, meta-theoretical work devoted to no less a task than the creation of " a general theory of structure such as must meet the requirements of an interdisciplinary epistemology."

Structuralism is defined as having three key ideas—wholeness, transformation, and self-regulation. Structures themselves are systems of transformations rather than static forms. Self-regulation proceeds by rules which define the structure.

Perhaps the closest we come, through all that is said about structures, to understanding what a structure really is, is in the chapter on mathematical and logical structures where the mathematical group is expounded and "may be viewed as a kind of prototype of structures in general." The group concept, as Piaget sees it, is arrived at not by abstraction of a common property of things but by 'reflective abstraction,' from our ways of acting on things, or the operations we perform on them. From analysis of this concept two very general 'co-ordinations among operations' emerge:

(1) The condition that a 'return to the starting point' always be possible.

(2) The condition that the same goal or terminus be attainable by alternate routes.

Because of these conditions, whatever has group structure is governed by an internal logic, is a self-regulating system.

Gestalt psychology qualifies as "the most spectacular form of psychological structuralism" although "the psychological Gestalt represents a type of structure .. that may be though pure, unpolluted by history or genesis, functionless and detached from the subject . . . such purity is hardly to be met with in the domain of empirical reality." .

But this book, as a whole, is little concerned with empirical reality. Rarely does it descend from the realm of second order abstraction and meta-theory. It can be relied upon to interest the more theoretically minded psychologist and may perhaps intrigue and inspire as many as it will undoubtedly irritate.

J. K. CLARKSON.

ROSENSHINE, B. (1971). *Teaching Behaviours and Student Achievement.* London: National Foundation for Educational Research in England and Wales, pp. 229, £3·25.

What bearing do the characteristics of teachers have upon the achievements of their pupils? Past research, concentrated on the study of the social and personal characteristics of teachers, has largely been unproductive, and interest has now shifted to the investigation of teaching behaviours in classrooms. Professor Rosenshine's book provides an excellent report, with commentary, on some 50 studies done in recent years on the associations between teaching behaviours and pupils' achievements. The findings he cites, despite numerous inconsistencies, problems of differing definitions and assessments of behaviour variables, and limitations of design in these investigations, suggest that we now have a far more promising line of inquiry into teaching as it is, and one that has considerable utility for those of us concerned with teacher education and professional practice.

The opening chapter gives a clear outline of the purposes of the book together with a helpful description of the kinds of studies included in the following chapters. Attention is drawn to the various types of observational instruments used to assess teaching behaviours, to the procedures used to obtain pupils' achievement scores, and to the statistical procedures used in the studies. The succeeding chapters contain accounts of teaching variables, reports on studies and discussion of findings. Different areas of teaching behaviours are dealt with in each chapter. These are inevitably rather loose groupings since some studies overlap and definitions of behaviours vary; however, they broadly break down into affective behaviours, such as teacher approval and disapproval; cognitive behaviours, covering such variables as achievement oriented businesslike behaviour, clarity, structuring and questioning; studies of teacher-student interaction; and then a number of single topics such as general ratings of teacher behaviour, and teacher experience and preparation variables. These chapters are not always easy reading because of the repeated need to examine and compare behavioural definitions and study designs, although the reader is helped by tabulated summaries of studies and by the generally judicious and clear comments on major trends across studies. Even so, it would have been helpful to have a final chapter in which major findings culled from earlier chapters were presented and discussed.

The sober presentation of research in this book does not, however, detract from the sheer interest of the findings. Here, put to a test, are many of our assertions about aspects of effective teaching, and tested not in the laboratory but in the ongoing circumstances of classrooms. Professor Rosenshine properly cautions us that measured pupil achievements in school subjects deal with only one field of educational criteria, and also that some teaching behaviours have been little studied; nevertheless, he is able to show that some teaching behaviours have been fairly consistently identified as associated with pupil achievement Teacher enthusiasm, and warmth are two high inference characteristics found to be positively related to achievement in a number of studies. Among the cognitive behaviours, clarity of presentation and objectives, achievement oriented businesslike teaching, variety in teaching behaviours and activities and the structuring of lessons and questioning provide some of the most consistent evidence on associations with achievement. Against all these, other variables such as teacher-pupil interaction, teacher approval / disapproval, and types of questions have produced more ambiguous results. However, with so many variables under review in the book one can only mention a few and hope that the prospective reader will follow his interests in detail.

This book does not set out to prescribe how one should teach. Rather, it leads into a fascinating field of research on teaching, and to a host of theoretical and practical questions concerning analytical studies of teaching, techniques of behaviour assessment, objectives and assessment in teacher training, and methods of training Educational psychology has tended to concentrate on either the pupil or on comparative studies of educational methods. It makes a pleasant change to read a book given over to the behavioural characteristics of teachers and based on findings from classrooms.

A. MORRISON.

SEGAL, S. J. (Ed.) (1971). *Imagery: Current Cognitive Approaches.* New York and London: Academic Press, pp. xiii+137, no price stated.

The five papers (chapters 2-6) which make up this book (with the addition of an introductory chapter by Segal summarising the historical context) were presented at a conference entitled "The Adaptive Function of Imagery," in New York, in 1970. The preceding three years had seen an increasing amount of research on imagery by experimental psychologists, e.g., Hebb, following Neisser's address on imagery to the 1967 conference of the New York City University's Centre for Research in Cognition and Affect. However, the five psychologists Paivio, Haber, Bugelski, Segal and Barber, had been doing empirical research on imagery before this revival of interest in the topic, and happily leave the impression that there is more to come

Allan Paivio (chapter 2, " Imagery and Language ") concentrates on defending the view that non-verbal imagery is an aspect of meaning mediating the comprehension of language, retention, and the production of connected discourse. He summarises the arguments against as well as for his views, but has not answered directly the question of individual differences in imagery. Should there not be critical research on the abilities in comprehension, retention and production of those (perhaps difficult to find) who report no imagery ? It would be interesting to know about a non-imager's retention of the phrase " The red-haired boy is peeling a green orange." Bugelski touches on this problem in chapter 4, when he tried to exclude visual or auditory images by using blind or deaf subjects, but came up against the difficulty that his subjects (bar one) were not completely or congenitally blind or deaf. Paivio's own sophisticated experiments deal with high and low imagery material (rather than with individuals) discussed in the light of psycholinguistic theory.

In chapter 3 ("Where are the visions in visual perception?") Haber describes several studies and some speculations of his own about early central representation. Following Neisser (1967) he uses instead of ' image ' the more neutral term ' icon ' to avoid " surplus meaning of the concept of an image." It would have been useful to have this statement explained and illustrated for those of us who are hazy about the difference. Headings for the rest of this paper are " Properties of Iconic Storage," " Is the Icon Visible ? " and " What Function does Iconic Storage Serve ? " There is a brief interesting comment on possible distinctions between what a perceiver sees and what he constructs.

Bugelski in chapter 4 (" The Definition of the Image ") discusses various approaches in the past (or avoidances in the case of Watson, whose reasons for discarding imagery are discussed). Bugelski is concerned also with experimental design (see above), and he stresses the point that imagery is an active process; he would prefer the term ' imaging " to be used more often.

In chapter 5 (" Processing the Stimulus in Imagery and Perception ") Segal reports an extensive series of experiments stemming from those of Kulpe and Perky where subjects decide whether or not a stimulus is present when they are asked to image successive objects on a screen. Modern signal detection methods are used, and the findings are related to Piaget's distinction between assimilation and accommodation (the task of signal detection being an accomodative task, whereas imaging is assimilative).

Segal argues that there is always a stimulus, even in the case of hallucinations, and so he would amend the definition of an image as occurring in the absence of a physical stimulus to " occurring in the absence of an *appropriate* or *relevant* stimulus." Discussion of hallucinations leads to a section on sensory deprivation, and then to one on subliminal perception. This is an original and stimulating paper, equally as regards theory and method.

Chapter 6 by T. X. Barger poses the interesting question: " Do similar processes or mechanisms underly the imagery or hallucinations found in an LSD situation and those that are elicited by suggestion in a hypnotic situation ? " A lucid, concise account is given of nine different effects of LSD, before the main topic of changes in visual perception.

These five papers are independent, but " all essentially stress centralist positions, beginning with the conscious, purposeful observer " (p. xii). A good bibliography is given at the end of each paper. As Segal says, " The more serious student of cognitive psychology will use this as an introduction to further work of these five psychologists as well as to others whose works have been cited " Segal hoped that the readership might include psychiatrists and clinical psychologists, but this seems unlikely except for chapter 6, since direct reference to clinical work has been deliberately excluded. The main appeal will be to teachers of psychology and research workers in the area of cognitive psychology. Historians also would find it fascinating to note the links that have been made with early problems, and their resumption from modern points of view.

L. R. PICKFORD.

SMITH, F. V. (1971). *Purpose in Animal Behaviour.* London: Hutchinson University Library, pp. 187, cloth £2·25, paper 90p.

This book is in two rather unrelated parts. In the introduction and the first chapter Professor Smith provides a brief historical and philosophical discussion of the problem of explanation in psychology and of purposive behaviour in particular. He suggests that many of the implications of causal explanation developed at a time when animistic explanations were dominant. In particular, the dichotomy of ' cause ' and ' effect ' may be related to the law of retribution in tribal society. He traces back to Hume the idea that cause and effect may be no more than a habit of mind when dealing with data which require no more than statement of probability of association. He proceeds to contrast, as the two dominant types of explanation in psychology, the giving of reasons based on intuitive understanding, and behaviourism. The sequence of the argument leads one to associate intuition with animism and behaviourism with Humean empiricism, although this connection is not made explicit. Particular attention is given to attempts to deal with purposive behaviour within the behaviourist framework and similarities in the approach of Tolman and McDougall are discussed. For both, the similarity in the behaviour of animals and men is important since they use the same language in dealing with both. In particular both ascribe purpose to animals and Smith suggests that three criteria can be used in justification—these are, independence as opposed to passivity, variability in attaining the same behavioural result, and retention of influences from situations not immediately present.

This provides the justification for the second, and much longer part of the book, since in the next six chapters we are given an interesting and scholarly catalogue of largely observational and naturalistic studies of the behaviour of many species in relation to social attachment, navigation, social organisation in non-primates, sexual behaviour, territorial behaviour, and social organisation in primates. In most cases it could be argued that these forms of behaviour meet Professor Smith's criteria of purposiveness although the argument is seldom made in the text.

In the final chapter an attempt is made to bring together the two sections of the book. The similarity of many of the items in the catalogue is used as a justification for comparing the behaviour of different species with that of man. That their behaviour meets the criteria of purposiveness is considered a justification for the purposive language of Tolman and to show that the scope of purposive behaviourism is greater now than it was in 1932. The greater variability of human behaviour makes it more difficult to infer purpose from observed behaviour so that we proceed with an " amalgam of methodologies " presumably supplementing our behaviourism with intuition. The result, according to Smith, is a justification for a return to McDougall's system of instincts first put forward in 1908 in his *Introduction to Social Psychology*, including, presumably, " his particular form of vitalism."

I have considerable sympathy with Professor Smith's choice of theoretical problem, and with his decision to relate his consideration of purposiveness to ethological observation of animal behaviour. But his honourable attempt has not succeeded. The discussion of purposiveness, while interesting, is incomplete. He ducks a proper consideration of cybernetic devices by saying that it could be claimed that they incorporate features of purposiveness supplied by the designer. This is a very incomplete and ambiguous argument which certainly does not justify ignoring all the work on artificial intelligence and the psychological and philosophical problems which it has raised. Miller, Galanter and Pribram, J. G. Taylor and Charles Taylor are all notable absentees from the bibliography. This is a pity, since ' purpose ' is under critical debate in psychology at the present time and much useful theoretical work has been done since the time of McDougall and Tolman.

C. I. HOWARTH.

SOUTHGATE, V. (1972). *Beginning Reading.* London: University of London Press, pp. 162, £1·25.

This is a collection of nine papers related to the teaching of reading to beginners, originally written by Mrs. Southgate between 1963 and 1970.

Four of these papers are concerned with i.t.a., one of them giving some of the main findings from the evaluation of i.t.a. undertaken by Mrs. Southgate and Professor Warburton for the Schools Council. The most important chapter in this part is the paper on approaching i.t.a. results with caution, in which she considers the factors other than the medium of i.t.a. which also affected the progress made in reading, such as reading drive, the stimulating effect of having new materials and the 'Hawthorne' effect. These factors are returned to in the final chapter of the book, "Formulae for Beginning Reading Tuition." This chapter, written as a guide for those about to do research on beginning reading in the classroom, includes as well as a definition of terms such as materials and methods, a discussion of the importance of studying the total learning situation, including the teacher.

The first part of the book is mainly concerned with the actual classroom situation. It starts with a simplified account of beginning reading in British schools which, given that the book is aimed at teachers and students, is rather too superficial. However, as far as teachers are concerned, the following two chapters on selecting an approach to, and the importance of structure in the teaching of reading are of the most practical benefit, both of them being an elaboration of the author's firm belief that it is essential to structure the reading situation and that the more 'progressive' the classroom situation the more important this structure becomes.

In the first of these chapters is given a list of factors which teachers should consider before selecting new materials. Including points on the teacher's beliefs and ideas, the needs of the children, a consideration of the contents of schemes and the ideas of the authors, the list seems very obvious. Yet, it is precisely this sort of information that the teacher needs and which a surprising number feel they did not get during their initial training.

The importance of structure may not seem so obvious, and to some appears to go contrary to 'informal' methods. Yet, as she points out, given such methods, together with the nature of written English and teacher turnover, planning and careful recording are even more necessary to ensure that the children get the most from the reading situation. Teachers should not apologise for actually teaching reading nor should such teaching be delayed until too late.

Throughout the book, this belief in the importance of structuring the reading situation, of careful planning of methods and materials is the dominant theme. It is apparent in her consideration of i.t.a. (which is one way of structuring written English) and in the practical advice for teachers and researchers, and stems from her own experience in the classroom.

JENNIFER STEWART.

WINNICOTT, D. W. (1971). *Therapeutic Consultations in Child Psychiatry.* London: Hogarth Press and Institute of Psychoanalysis, pp. 410, £4·50.

Whatever else it may be, this is a picture-book. And it is fitting, in a way, that the late Dr. Winnicott should be commemorated as an artist. An artist, that is, not just in the 'squiggle-games' that he played with his young patients as a 'projective,' diagnostic and therapeutic device, but a master of the art of communicating with troubled people as a prelude to helping them towards a brighter, steadier and richer life—which is what the games, and the author's work, were all about.

The book is also a master-class. The technique, which consists of me drawing a squiggle on a piece of paper, and you then turning it into something and identifying the joint product, is introduced. The theoretical assumptions underlying its use as a means for a child to express his dominant anxieties and phantasies of the moment, are briefly set out. We are then ' talked through ' 21 of these psychiatric duets, each record consisting of a description of the referral circumstances and symptomatology, followed by reproductions of the patient's entire series of squiggle-drawings linked by partly verbatim commentary. Of the 20 patients aged between 5 and 16 who draw, four produce fewer than 13 joint pictures, but none fewer than 10 ; four produce more than 25, but none more than 30 The mean number is near enough 17. Most patients were seen for only one or two diagnostic-assessment consultations, while a psychiatric colleague or home GP was managing the case as a whole ; but there is follow-up material (up to six years later for some) on many of the children.

The impression must not be given, however, that this is a meretricious exhibition of instant short-term psychotherapy. On the contrary : Winnicott is at pains to underline two disclaimers, which pervade his clinical discussions. One is that he is not concerned to show that the children ' got better ' as a result of his solo performances with this magical technique. The most he claims is a kind of communication breakthrough which enables the child to use the supportive and therapeutic resources of his environment (parents, siblings, teachers, friends, doctors). He is insistent on the need for such resources, and generous in his tributes to those who constituted them in particular cases. The second disclaimer is that the material is not elicited mainly, and is only seldom used, as a basis for blinding psychodynamic interpretations. There are almost more examples of his refraining from an interpretation than giving one. And when he does, the background theory is taken for granted. Well, as he says, if we don't know what it is by now, we can look at some of his other books (an edited bibliography of which is appended). It is, of course, a slightly personal quodlibet of Freudian and Kleinian themes ; and he often probes more-or-less explicitly for dream-reports to amplify and illuminate the significance of the squiggle-drawings.

Sceptics will no doubt see inconsistency in some of his remarks about the possibility of unwittingly influencing what the child produces, so that the psychiatrist is presented with apparently spontaneous material which conforms artificially to his own theories. Winnicott concedes on the one hand (p. 10) that if one falsely interprets something the patient does as meaning *x*, when it is in fact a sign of *y*, you may deter him from giving further signs of *y*, and thus fail ever to recognise his *y*-problem. On the other hand, in justifying his way of completing a particular girl-patient's squiggle, he disarmingly anticipates the charge of contamination. " This idea came out of myself, and was not in any way suggested by her squiggle. In this work I allow myself freedom to be spontaneous and impulsive. This does not interfere with the process in the child " (p. 178).

The author rightly points out that a unique feature of these records, which make them especially valuable for teaching, is their completeness. Here is the *whole* story of his psychodynamic communications, through a ' projective ' medium and for a very few sessions with a number of youngsters—some of them scarcely disturbed, others apparently psychotic. The method can be expounded, imitated, evaluated and corrected because the student is given as much data as Winnicott had himself. What, however, of the man behind the method ? "You know my methods " said Sherlock Holmes, "Apply them " ; but Watson was no Holmes. Nor would Winnicott want to be thought one either. For here is no nonchalant omnipotence and prescient serendipity ; here is an artist who has laboured at techniques in order to be able to forget about it in ' playing music ' (to use his own imagery). He does not pretend to be able, from his wide experience, to see the developments coming in advance ; he tells us when he is surprised by the way things turn out ; and the last word that he writes in the book is " truth."

NEIL M. CHESHIRE.

PUBLICATIONS RECEIVED

Books for review have been selected from the following. (" n.p." means " no price stated.")

Adams, M., and Lovejoy, H. (1972). *The Mentally Subnormal: Social Work Approaches.* London: Wm. Heinemann Medical Books, Ltd., pp. 296, £3·50.

Althusser, L. (1972). *For Marx.* London: Penguin, pp. 271, £1.

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PERSONALITY AND SCHOLASTIC ACHIEVEMENT IN THREE ETHNIC GROUPS

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Summary. Scores on the Junior Eysenck Personality Inventory of some 2,000 white, Negro, and Mexican-American school children, ages 9 to 13, were examined in relation to measures of intelligence and home environment as predictors of scholastic achievement The JEPI scales show quite low, but significant and systematic, correlations with achievement, Extraversion (E) correlates positively and Neuroticism (N) and the Lie (L) scale correlate negatively with achievement. The independent contributions separately of E, N, and L. to achievement variance over the variance accounted for by the ability and background measures are negligible, but the three JEPI scales combined in a multiple regression equation along with measures of intelligence and home background independently contribute a small share of the predicted part of the scholastic achievement variance. In this the three ethnic groups do not differ appreciably or systematically, nor do the school grades from 4 to 8 (ages 9 to 13), although there are significant and systematic age and ethnic group differences in mean scores on the JEPI scales.

INTRODUCTION

The far from perfect validity of tests of cognitive abilities for predicting scholastic achievement has caused numerous investigators to look to the personality domain for additional sources of variance in pupils' school performance. Since the introduction of the Junior Eysenck Personality Inventory (S. B. G. Eysenck, 1965), which measures extraversion (E scale) and neuroticism (N scale), probably no other measures of personality have been as extensively investigated in relationship to mental abilities and attainments.

A review of the major studies, all but two of which have been done in England, now reveals enough consistency to permit certain broad generalisations First, there can be little doubt by now that E and N both show non-zero correlations with scholastic performance. It is equally clear that these correlations, though statistically significant, are quite low as compared, for example, with the correlations of mental test scores, such as IQ, or of indices of socioeconomic status, with measures of scholastic performance. E shows a somewhat higher relationship than N to achievement. For both variables the degree and direction of correlation is not consistent from primary school pupils to university students.

A survey of recent work has been published by Entwistle (1972). As to E, a number of studies using children in the age range from about 8 to 11 years found a low but significant *positive* correlation with scholastic achievement (Eysenck and Cookson, 1969; Frost, 1969; Rushton, 1960; Savage, 1966). With slightly older children in secondary modern and grammar schools, Callard and Goodfellow (1962) found no significant correlation of E with achievement. In still older groups, comprised of college and university students, the correlation reverses, and a significant *negative* relationship is found between E and academic success (Bendig, 1960; Broadbent, 1958; Furneaux, 1962; Kline, 1966; Lynn, 1959). The age range in which the inversion of the relationship occurs has not been precisely investigated, but two studies appear relevant. Child (1964) found that after the 11+ examination the promoted children were less extraverted than the demoted children; and Astington (1960) found that the academically more successful grammar school boys were less extraverted than the average. A reasonable hypothesis based on the sketchy evidence is that early puberty is the period of reversal of the correlation between E and achievement. Another possibility, however, is that the correlation is positive at all ages in the general population but is negative (at all ages) in the part of the population which in adolescence is selected for the more academic pursuits leading to university entrance.

E has been found to have little or no consistent relationship to intellectual ability *per se*. Lynn and Gordon (1961) found no significant correlation with Raven's Progressive Matrices, and S. B. G. Eysenck (1965) reported a lack of correlation between E and a verbal IQ test. A more detailed critique of the research on E and achievement is provided by Frost (1969), who also reports the results of a multiple regression analysis as showing that E made no independent contribution to the prediction of scholastic achievement when it was included among a host of other predictor variables. However, Frost's predictor variables included other personality measures which might also have been loaded with extraversion, so it was not a really fair test of the independent contribution of E to the prediction of scholastic achievement.

As to N, a similar picture emerges, although the correlations with achievement are negative and are generally smaller than for E. Studies with children up to 11 or 12 years of age have consistently found a weak but significant *negative* correlation between N and achievement (Astington, 1966; Callard and Goodfellow, 1962; Eysenck and Cookson, 1969; Rushton, 1966; Savage, 1966). One study, however, found no significant correlation of N with achievement (Frost, 1968). Studies with university students, on the other hand, report low *positive* correlations of N with academic performance (Furneaux, 1962; Kelvin *et al.*, 1965; Lynn, 1959). N has been found to have a slight negative correlation with verbal IQ in children (S. B. G. Eysenck, 1965), while the non-verbal Raven matrices, a good measure of *g*, showed no correlation at all with N.

The JEPI also includes a 12-item scale (L) for the detection of 'faking good.' High L scores probably reflect also a kind of moralistic naiveté or immaturity concerning 'good' or socially acceptable behaviour. L scores decline markedly from childhood to maturity. Interestingly, L shows a substantial negative correlation with scholastic performance, is not significantly related to E, and correlates negatively with N—perhaps a reflection of 'faking good' (Eysenck and Cookson, 1969). L also shows negative correlations between $-\cdot 2$ and $-\cdot 3$ with verbal IQ (S. B. G. Eysenck, 1965), again perhaps a reflection of immaturity and naiveté.

The present study examines the relationship of the JEPI scales to mental ability, achievement in various scholastic subjects, and socio-economic status (SES) in large representative samples of three quite dissimilar cultural and ethnic groups, ages 9 to 13, in a California school district.

THE STUDY

Subjects.

The subjects were representative samples of white, Negro and Mexican-American pupils in grades 4 through 8 (ages 9 to 13) in a California school district. The mean IQ and scholastic achievement in these three groups are very close to these groups' national averages on standardised tests. A total of more than 2,200 pupils were tested in their regular classrooms. The sample sizes of the various groups are given in Table 1.

The predictor tests were group-administered in the Fall, near the beginning of the school year, and the scholastic achievement tests in the Spring, near the end of the school year.

Tests and Measurements.

The predictor variables consisted of three intelligence tests, measures of socio-economic status (SES) and home background factors, the three scales of the JEPI, i.e., Extraversion, Neuroticism, and the Lie scale, and the subject's sex, treated as a quantised variable, with male=0, female=1.

The standardised intelligence tests were the Lorge-Thorndike Verbal and Non-verbal IQ tests, and Raven's Progressive Matrices (Coloured Progressive Matrices used in grades 4–6; Standard Progressive Matrices used in grades 7 and 8), a non-verbal reasoning test based upon figural materials.

The SES background of the subjects was assessed by the Home Index (Gough, 1949), a 24-item questionnaire which yields four scores reflecting different aspects of the home environment related to SES: educational and occupational level of the parents, material possessions in the home, degree of parental participation in middle-class social and civic activities, and formal exposure to cultural advantages such as music and other arts.

The personality measures were the scales of the Junior Eysenck Personality Inventory, which has been described in detail by S. B. G. Eysenck (1965). The Extraversion (E) scale represents the continuum of social extraversion-introversion. High scores reflect sociability, outgoingness and carefreeness. The Neuroticism (N) scale reflects emotional instability, anxiety proneness, and the tendency to develop neurotic symptoms under stress. The Lie (L) scale is a validity detector consisting of 12 items which are rarely answered in the keyed (i.e., 'lie') direction by the vast majority of subjects. A high L score indicates 'faking good.' The reading level required by the JEPI is quite easy and appropriate for the majority of children beyond third grade (age 8).

The dependent variable in this study, scholastic achievement, was assessed by the forms of the Stanford Achievement Test standardised for grades 4 to 8. These tests measure Reading Comprehension ('Paragraph Meaning'), Spelling, Grammar ('Language'), Mechanical Arithmetic ('Arithmetic Computation'), Arithmetic Concepts, and Applied Arithmetic. All of these basic subjects are taught in the schools.

RESULTS AND DISCUSSION.

Group Means and Standard Deviations.

These are shown in Tables 1 to 3. The significance of the group mean differences was determined by means of the *t* test, the values of which are also shown in Tables 1 to 3.

TABLE 1

EXTRAVERSION SCALE: MEANS AND STANDARD DEVIATIONS.

	White			Negro			Mexican			*t* Tests		
Grade	N	Mean	SD	N	Mean	SD	N	Mean	SD	W–N	W–M	N–M
4	113	16·18	3·34	129	15·23	3·19	145	15·01	2·97	2·25*	2·93†	·59
5	144	17·65	3·65	132	15·45	3·25	135	15·98	3·53	5·30†	3·88†	−1·28
6	131	18·52	3·41	124	17·05	3·07	126	15·81	4·05	3·62†	5·79†	2·37†
7	156	17·98	3·34	167	16·52	3·37	174	15·85	3·78	3·91†	5·43†	1·73
8	176	18·17	4·06	181	16·05	3·61	178	16·08	4·10	5·21†	4·82†	−·07
Total	720	17·78	3·41	733	16·07	3·41	758	15·76	3·74	9·56†	10·86†	1·67

* P< ·05 † P< ·01

TABLE 2

Neuroticism Scale: Means and Standard Deviations.

	White		Negro		Mexican		*t* Tests		
Grade	Mean	SD	Mean	SD	Mean	SD	W–N	W–M	N–M
4	15·46	5·02	15·34	4·75	15·57	5·08	·19	–·17	–·39
5	15·32	4·76	15·69	3·97	16·17	4·97	–·70	–1·45	–·87
6	18·37	5·64	14·35	4·69	15·12	5·17	6·18†	4·81*	–1·25
7	13·63	5·31	14·13	5·07	14·53	4·64	–·86	–1·63	–·76
8	13·50	4·97	13·29	4·98	13·33	5·12	·40	·32	–·07
Total	15·09	5·42	14·45	4·85	14·84	5·08	2·37*	·91	–1·52

* P< ·05   † P< ·01

TABLE 3

Lie Scale: Means and Standard Deviations.

	White		Negro		Mexican		*t* Tests		
Grade	Mean	SD	Mean	SD	Mean	SD	W–N	W–M	N–M
4	4·07	2·43	4·44	2·33	4·59	2·43	–1·20	–1·70	–·52
5	3·39	2·21	3·89	2·18	4·01	2·26	–1·89	–2·31*	–·44
6	3·15	2·04	3·71	2·49	3·37	2·32	–1·96*	–·81	1·12
7	2·36	1·94	3·68	2·84	3·49	2·26	–4·90†	–4·89†	·68
8	2·08	1·85	3·29	2·11	3·49	2·45	–5·96†	–6·11†	–·83
Total	2·91	3·06	3·76	2·44	3·77	2·40	–5·85†	–5·99†	–·08

* P< ·05   † P< ·01

On E, the means and sds of the white groups at each grade are very close to the English norms (S. B. G. Eysenck, 1965), usually differing less than 1·0 score points. The E means of the Negro and Mexican groups, however, are slightly but significantly lower. This is contrary to the popular stereotype of Negro children as being especially extraverted.

On N, the white groups are significantly higher than the English norms, by 3 to 5 points. The whites are significantly higher in N than the Negroes but do not differ significantly from the Mexicans. Negroes and Mexicans are both significantly higher, by 2 to 3 points, than the English norms.

The Lie scale results are somewhat more complex. For all groups, the L scores in the early grades are lower than the English norms for the same ages, but the American scores decline less rapidly than the English scores and by about age 13 the American and English means are about the same. The American white group tends to be a bit lower than the English and is very significantly lower, overall, than the Negro and Mexican groups. The L scale appears to reflect a kind of naiveté which is related to mental age; L is higher in younger children and also in older children with below-average IQs, which probably accounts for some of the difference between the mean L of whites, on the one hand, and of Negroes and Mexicans (whose average IQs are 10 to 15 points lower than the white IQ) on the other. However, the fact that English children, with IQs presumably similar to that of American whites, have even higher L scores than the Negroes and Mexicans suggests that the L score must largely reflect certain cultural standards as well.

Correlations of JEPI With Other Measures.

Tables 4, 5 and 6 show the correlations of E, N and L with all the other variables in the study. Also, a principal components analysis was done on all the variables to determine the loadings of E, N and L on the first principal component (the general factor common to all the measures); these loadings are shown in the last row of Tables 4 to 6.

For all three of the JEPI scales, the correlations with the other variables are low and often non-significant.

E has negligible correlations with the intelligence measures (with the strange exception at grade 6), which accords with other studies. E shows slightly more than chance positive correlation with the scholastic achievement measures, but these vary unsystematically in magnitude from one grade to another. E is positively and significantly correlated with the SES measures, especially the index of parental education and occupational status. Most of the loadings of E on the first principal component are significant and average about ·20, indicating that E significantly shares some common variance in this domain. The three ethnic groups do not differ overall in this respect ; the ethnic variations within grades are quite irregular.

N shows much less correlation with abilities, achievement, and environment than does E. The correlations for N are consistently small and negative in all groups. There is no systematic trend across grades. As found in other studies, the highest negative correlations are between N and L, since ' faking good ' necessarily raises L and lowers N. As can be seen from the insignificant loadings on the first principal component, N shares very little common variance in this domain.

The L scale shows significant negative correlation with achievement, and these tend to be higher than the correlations with intelligence (note the grade 4 white group), which suggests the negative correlation of L with achievement is not entirely accountable in terms of intelligence or mental age. This, too, accords with other findings (Eysenck and Cookson, 1969).

Independent Contribution of the JEPI to the Prediction of Achievement.

Of greater interest perhaps than the zero order correlations of the JEPI scales with achievement is their independent contribution to the achievement variance over the variance accounted for in terms of the cognitive ability and home background measures. A multiple regression analysis was performed to answer this question. It provides the partial correlation of E, N and L with achievement when the effects of the ability and background variables are held constant (i.e., statistically partialled out). The correlations of E, N and L with achievement independent of the mental ability and home background variables are shown in Table 7. For the sake of clarity the table shows only correlations which are significant beyond the 5 per cent level. No systematic pattern over grades or ethnic groups can be discerned.

TABLE 4

CORRELATIONS OF EXTRAVERSION WITH OTHER VARIABLES IN WHITE, NEGRO AND MEXICAN GROUPS.

Grade	4			5			6			7			8			Average		
Variable	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M
Intelligence:																		
Lorge-Thorndike Non-verbal I.Q.	02	13	01	−02	15	07	20	37†	27†	07	12	03	04	04	11	06	16†	10†
Lorge-Thorndike Verbal IQ	08	16	08	08	15	11	27†	25†	30†	09	17*	16	06	08	18*	12†	16†	17†
Raven's Progressive Matrices	03	15	−02	04	12	−10	09	22*	26†	01	08	−03	08	−03	06	05	11†	03
Stanford Achievement Tests:																		
Reading Comprehension	09	02	05	05	06	10	22*	29†	19*	17*	05	09	10	04	09	13†	09*	10†
Spelling	03	22*	−03	09	−05	05	22*	35†	16	14	17*	15	05	02	04	11†	14†	07
Grammar	11	11	06	13	10	18	31†	25†	33†	24†	06	07	07	12	11	17†	13†	15†
Mechanical Arithmetic	04	18	02	01	03	00	12	14	28†	19*	16	−03	−05	−07	06	06	09*	07
Arithmetic Concepts	26*	13	05	24†	12	11	11	17	31†	08	08	12	−06	−11	16	13†	08*	15†
Applied Arithmetic	10	04	21*	00	08	−05	12	18	28†	07	04	00	−10	09	19*	04	09*	13†
Home Index (SES):																		
Parents' Education	28†	18*	11	27†	11	10	04	16	29†	04	23†	23	10	18*	06	15†	17†	16†
Material Possessions	28†	23*	02	12	14	11	14	09	22*	03	14	−04	14	25†	22†	14†	17†	11†
Social Activities	23*	01	−01	24†	19*	03	15	19*	16	17*	33†	10	08	12	05	17†	17†	07
Cultural Advantages	01	05	−08	11	−01	07	07	−05	10	07	13	04	−02	18*	03	05	06	03
Sex (Female=1, Male=0)	−30†	−01	−01	−13	−06	−05	−04	−09	−13	07	−05	−04	−10	05	12	−10†	−03	−02
JEPI: N Scale	−04	08	10	−21*	10	−10	−17	17	00	15	11	00	−09	−08	−08	−13†	11†	−02
L Scale	−04	01	−08	−16	−17	−18*	−05	−17	−20*	−15	−06	−18*	−17*	−16	−31†	−14†	−09*	−19†
Loading of E on First Principal Component	21*	24*	10	15	13	11	33†	37†	40†	21*	25†	15	10	09	24†	20†	22†	20†

Decimals omitted. * P<·05 † P<·01

TABLE 5

CORRELATIONS OF NEUROTICISM WITH OTHER VARIABLES IN WHITE, NEGRO AND MEXICAN GROUPS.

Grade	4			5			6			7			8			Average		
Variable	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M
Intelligence :																		
Lorge-Thorndike Non-verbal IQ	–03	–03	09	–11	22*	–06	–21*	–01	–03	–04	–09	–16	00	–05	01	08*	01	–03
Lorge-Thorndike Verbal IQ	–00	04	–02	–10	11	–05	–24†	–09	–10	–02	–12	–05	01	–00	04	–07	–01	–04
Raven's Progressive Matrices	–05	06	10	02	19*	07	–19*	–05	12	–15	–01	–02	–01	05	–17*	–08*	05	02
Stanford Achievement Tests :																		
Reading Comprehension	–08	–18	02	05	08	–10	–34†	–07	–08	–10	11	–17*	–07	04	–07	–11†	–00	–08*
Spelling	–02	02	00	01	–01	00	–26†	08	–05	–08	–03	–00	–01	08	–05	–07	03	–02
Grammar	–01	–13	–04	–10	03	05	–15	02	–13	–11	–05	–03	10	–03	–11	–05	–03	–05
Mechanical Arithmetic	11	–11	03	11	09	–14	–24†	14	–09	–12	15	–12	–08	–03	–10	–09*	05	–18*
Arithmetic Concepts	00	–15	03	–01	00	–00	–26†	–11	–09	–10	–03	–11	–03	–04	–15	–08*	–07	–06
Applied Arithmetic	07	–01	14	–04	–11	–18	–22*	–08	–08	–15	01	02	10	–21†	–09	–05	–08*	–04
Home Index (SES)																		
Parents' Education	–06	06	06	–10	–05	–07	–22*	00	07	–04	01	–12	13	–09	–04	–06	–01	–02
Material Possessions	–07	–14	–11	–05	03	–09	–19*	–08	–03	03	–07	–08	–02	–06	–15	–06	–06	–09*
Social Activities	–02	01	–04	08	06	05	–17	13	04	03	17*	–04	17	–04	02	–00	07	–01
Cultural Advantages	03	11	–00	–14	–09	–05	–05	08	–12	–04	–01	07	18*	02	–00	–00	02	–02
Sex (Female=1, Male=0)	14	04	21*	24†	13	–04	19*	–07	04	09	07	16*	16*	05	13	16†	04	10†
JEPI : E Scale	–04	08	10	–21*	10	–10	–17	17	00	–15	11	00	–09	–08	–08	–13†	08*	–02
L Scale	–50†	–38†	–46†	–29†	–22*	–44†	–38†	–43†	–34†	–32†	–36†	–28†	–32†	–31†	–23†	–36†	–34†	–35†
Loading of N on First Principal Component	01	–08	05	–10	14	–07	–38†	10	–08	–14	–02	–13	09	–03	–09	–10†	00	–06

Decimals omitted * P<·05 †P<·01

TABLE 6

CORRELATIONS OF LIE SCALE WITH OTHER VARIABLES IN WHITE, NEGRO AND MEXICAN GROUPS.

Grade	4			5			6			7			8			Average		
Variable	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M
Intelligence :																		
Lorge-Thorndike Non-verbal IQ	–08	09	–15	03	–13	01	01	–29†	–29†	–09	–07	–20*	–28†	–13	–18*	–08*	–11*	–16*
Lorge-Thorndike Verbal IQ	–17	–06	00	01	–04	–05	–04	–13	–21*	–14	–16	–19*	–31†	–17*	–18*	–13†	–11†	–13†
Raven's Progressive Matrices	–15	–01	–17	–13	–17.	–10	–02	–10	–28†	–08	–08	–12	–26†	–14	–10	–13†	–10†	–15†
Stanford Achievement Tests :																		
Reading Comprehension	–32†	09	–01	02	–04	08	–03	–17	–20*	–16	–18*	–17*	–27†	–18*	–21*	–15†	–10†	–10†
Spelling	–18	–00	–06	–00	03	05	05	–13	–20*	–05	–05	–16	–19*	–16	–12	–07	–06	–07
Grammar	–29†	06	06	–03	–03	–08	–07	–16	–18	–17*	–18*	–11	–22†	–24†	–15	–16†	–11†	–09*
Mechanical Arithmetic	–17	07	–01	01	–03	15	–05	–12	–10	–01	02	01	–14	–21*	–06	–07	–05	–00
Arithmetic Concepts	–29†	–02	–17	–08	–02	02	–10	–13	–24*	15	03	–04	–21*	–11	–06	17†	–06	–10†
Applied Arithmetic	–36†	04	–21*	–02	00	08	–06	–22*	–22*	–10	–11	–05	–21†	–09	–01	–15†	–08*	–08*
Home Index (SES) :																		
Parents' Education	–16	–01	01	–03	11	–06	15	13	02	–05	02	00	–23	04	–03	–06	06	–01
Material Possessions	08	–09	17	07	06	–10	01	05	04	–07	01	02	–12	–11	–11	–01	–02	00
Social Activities	–02	01	–08	–11	–01	–08	–02	–09	–02	–13	–03	–11	–11	04	–19*	–08*	–02	–10†
Cultural Advantages	–03	–04	15	15	–05	11	–09	08	10	03	02	–11	–17*	–11	–20†	–02	–02	01
Sex (Female=1, Male=0)	03	15	09	09	27†	33†	–01	22*	10	08	03	–08	00	13	–05	04	16†	08*
JEPI : E Scale	–04	01	–08	–16	–17*	–18*	–05	–18	–20*	–15	–06	–18*	–17*	–06	–31†	–11†	–09	–19†
N Scale	–50†	–38	–46†	–29†	–22*	–44†	–38†	–43†	–34†	–32†	–36†	–28†	–32†	–31†	–23†	–36†	–34†	–35†
Loading of L on First Principal Component	–32†	02	–09	–03	–08	–00	–01	–27†	–27†	–12	–13	–19*	–38†	–22†	–23†	–17†	–14†	–16†

Decimals omitted. * P< ·05 †P< ·01

TABLE 7

PARTIAL CORRELATIONS AND SIGNIFICANCE OF INDEPENDENT CONTRIBUTION OF JEPI SCALES TO PREDICTION OF SCHOLASTIC ACHIEVEMENT

Grade		4			5			6			7			8		
Predictor Scale	Criterion Variable	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M
E	Reading Comprehension											–16*				
	Spelling								19*							
	Grammar							19*								
	Mechanical Arithmetic															
	Arithmetic Concepts				21*									–22†	–15*	
	Applied Arithmetic			17*										–22†		
N	Reading Comprehension	–27†						–21*				16*				
	Spelling							–21*								
	Grammar															
	Mechanical Arithmetic							–20*	–23*			19*				
	Arithmetic Concepts															
	Applied Arithmetic														–24†	
L	Reading Comprehension	–33†														
	Spelling															
	Grammar	–28†													–16*	
	Mechanical Arithmetic														–16*	
	Arithmetic Concepts	–20*														
	Applied Arithmetic	–29†														

Correlations not significantly different from zero at the 5 per cent level are omitted.

Decimals omitted. * $P < \cdot 05$ † $P < \cdot 01$

TABLE 8

Percent of Total Variance in Achievement Scores (in Italics) and Percent of Predicted Variance (in Roman Type) Accounted for by E, N and L Scales of JEPI Independently of Intellectual and SES Predictor Variables.

Grade	4			5			6			7			8			Averages		
Achievement Tests	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M	W	N	M
Reading Comprehension	*18·7*	*2·6*	*1·0*	*2·1*	*1·0*	*1·3*	*5·6*	*1·6*	*6·1*	*2·5*	*5·9*	*3·5*	*2·2*	*0·2*	*4·0*	*6·2*	*2·3*	*3·2*
	31·7	8·0	3·0	5·1	3·1	3·2	9·0	2·5	9·5	3·8	14·3	9·6	4·0	0·4	7·6	10·7	5·7	6·6
Spelling	*4·6*	*2·0*	*2·3*	*1·3*	*4·7*	*2·1*	*4·4*	*9·1*	*3·7*	*1·0*	*0·3*	*0·4*	*1·0*	*0·4*	*3·3*	*2·5*	*3·3*	*2·4*
	8·2	5·5	5·2	2·9	13·7	4·3	10·0	15·5	6·9	2·3	0·9	1·0	1·9	0·9	7·3	5·1	7·3	4·9
Grammar	*13·0*	*2·2*	*0·6*	*1·0*	*0·9*	*2·5*	*3·7*	*2·8*	*5·1*	*4·9*	*3·0*	*0·1*	*0·3*	*3·8*	*1·8*	*4·6*	*2·5*	*2·0*
	19·3	7·7	1·3	1·6	2·1	5·7	5·7	4·3	8·2	10·6	7·3	0·3	0·6	7·7	5·9	7·6	5·8	4·3
Mechanical Arithmetic	*0·8*	*3·2*	*0·1*	*4·4*	*0·3*	*2·1*	*5·3*	*6·5*	*2·1*	*1·9*	*5·1*	*1·2*	*4·4*	*4·9*	*1·4*	*3·4*	*4·0*	*1·4*
	2·8	18·9	0·4	17·4	1·1	8·4	17·0	18·8	6·2	4·4	22·8	4·5	9·6	15·0	4·8	10·2	15·3	4·9
Arithmetic Concepts	*5·7*	*3·4*	*2·9*	*6·7*	*1·6*	*2·4*	*6·3*	*1·2*	*3·9*	*1·6*	*0·2*	*0·8*	*6·7*	*2·8*	*1·9*	*5·4*	*1·8*	*2·4*
	12·9	14·2	10·1	20·4	7·4	6·0	13·6	2·7	7·7	2·9	1·5	3·0	12·1	6·7	4·9	12·4	6·5	6·3
Applied Arithmetic	*10·2*	*0·9*	*6·0*	*0·8*	*2·4*	*4·8*	*2·3*	*3·1*	*2·4*	*1·5*	*0·9*	*3·1*	*4·9*	*6·7*	*3·1*	*3·9*	*2·8*	*3·9*
	20·0	3·5	12·8	1·8	8·6	11·3	5·0	6·6	5·0	3·6	3·2	10·9	12·5	20·1	9·3	8·6	8·4	9·9
Averages	*8·8*	*2·5*	*2·2*	*2·7*	*1·8*	*2·5*	*4·6*	*4·1*	*3·9*	*2·2*	*2·6*	*1·5*	*3·3*	*3·1*	*2·6*	*4·3*	*2·8*	*2·5*
	15·8	9·6	5·5	8·2	6·0	6·5	10·1	8·4	7·3	4·6	8·3	4·9	6·8	8·5	6·6	9·1	8·2	6·1

In terms of practical usefulness, readers will be concerned less with the statistical significance of the correlations than with the actual degree of the scales' independent contribution to the prediction of scholastic performance. Table 8, therefore, shows the percent of the variance in achievement scores that is predictable by the combined E, N and L scales in a multiple regression equation which includes also the intelligence and SES measures. Two estimates are given in Table 8, the first (in italics) is the percent of *total* achievement variance accounted for by the JEPI ; the second (in Roman type) is the percent of the *predicted* (by all variables in the multiple regression equation) variance in achievement accounted for by the JEPI. (The overall multiple *R*s were mostly in the range from ·5 to ·7). These percentages can be evaluated only in terms of one's own theoretical or applied purpose with respect to the relationship between the JEPI and scholastic achievement. By far the most of the predictive power of the multiple regression equation is carried by the ability tests. But as can be seen in Table 8, the JEPI consistently contributes a small share to the predicted variance in achievement, independently of intelligence and SES.

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TEST-RETEST RELIABILITIES OF A NEW PERSONALITY QUESTIONNAIRE FOR CHILDREN

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SUMMARY. Different groups of children, varying in age, were tested and retested after varying intervals (one month, six months, twelve months) with a new Personality Questionnaire (PQ) containing scales for the measurement of the new factor of psychoticism (P), as well as of E, N and L. It was found that the new scales had retest reliabilities very similar to those established for the JEPI,and if anything a little higher. It was concluded that with suitable precautions the new questionnaire would be no less useful than the old one, as far as reliability is concerned.

INTRODUCTION

NOT very much is known about the test-retest reliability of personality inventories for children, particularly at the primary school level; this study was designed to throw some light on this question. The questionnaire used (called simply the Personality Questionnaire, or PQ) was designed to incorporate a new dimension of personality, called provisionally ' psychoticism ' or P-factor, into the framework of extraversion and neuroticism; the PQ also contains a Lie scale (L scale). The original conception of the P factor, and the construction of the first sets of questions for its measurement, have been described in detail (H. J. Eysenck and S. B. G. Eysenck, 1968); later studies by S. B. G. Eysenck and H. J. Eysenck (1968, 1969) have given details about subsequent developments of the adult version. The original version of the children's PQ has been described by S. B. G. Eysenck and H. J. Eysenck (1969), and subsequent developments by Eysenck, Easting and Eysenck (1971) and H. J. Eysenck and S. B. G. Eysenck (1971). A detailed discussion of the genetic model on which the conception of the P factor is based has been given by Eysenck (1973), together with evidence regarding its heritability. In view of the close genetic connection between psychosis and psychopathy, it was thought that high P scores would be characteristic not only of psychotics (Verma and Eysenck, 1973) but also of criminals, and this has been shown to be so by S. B. G. Eysenck and H. J. Eysenck (1970, 1971) and H. J. Eysenck and S. B. G. Eysenck (1971). P correlates closely with certain types of sexual behaviour (Eysenck, 1972) and attitudes (Eysenck, 1970, 1971). In addition, there are several unpublished studies linking P with a variety of experimental procedures, from vigilance to evoked potentials on the EEG.

It is important to realise that in spite of its clinical connotation the P factor (like N) claims to'apply to the *normal* child (or adult), with clinically diagnosed psychotics or neurotics only the extreme end of the distribution. P, like N and E, is based essentially on factor analysis of item intercorrelations; the constitution of the factor makes it essentially a test of the original hypothesis expressed in the choice of items for inclusion. Several successive sets of items were in fact factor analysed, as outlined in the publications mentioned above; the final version consists of an 18-item P scale, a 24-item E scale, a 20-item N scale, and a 20-item L scale. The items are almost identical with those published in previous versions, changes being slight and in line with the general character of the factor as outlined previously. High P scorers are seen to be solitary ; not caring for other people ; troublesome, not fitting in ; cruel, inhumane ; lacking in feeling, insensitive ; hostile to others, aggressive ; liking odd, unusual things ; disregarding danger, foolhardy ; liking to make fools of others, upsetting them. What emerges from these admittedly subjective interpretations of questionnaire responses is a fairly congruent picture of an odd, isolated, troublesome child ; glacial and lacking in human feelings for his fellow-beings and for animals ; aggressive and hostile, even to near-and-dear ones ; trying to make up for lack of feeling by indulging in sensation-seeking ' arousal jags ' without thinking of the dangers involved. As one might have expected from these descriptions, and from the adult connection between P and criminality, it has been found in children that high P scorers are characterised by bad behaviour in school, and by antisocial conduct outside it (Allsopp, 1972).

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* The new questionnaire described in this publication has not yet been published, but research workers intending to use the new scale may purchase any desired quantities from the printing firm whose address will be furnished on request. We are indebted to the following for help in securing the data on which this paper is based: G. Easting, M. Morton and J. Allsopp.

RESULTS

In order to ascertain the test-retest reliability of the scales of this test, several different sets of children were tested twice, with either one month, six months, or 12 months, intervening between occasions. Table 1 shows the values obtained by Allsopp (1972) with groups of white, and smaller groups of coloured girls. The white and coloured girls are kept separate because most of the latter had some difficulties with the English language, this not being their native tongue. Table 2 shows similar values for boys, tested at another school, by another investigator. The values in Table 1 are typically higher than those in Table 2, centring around ·8 or even a little higher ; those in Table 2 centre around ·75 or thereabouts. This slight difference may be due to the fact that for the girls the teacher involved was also the investigator ; for the boys the investigator was not their teacher. If the difference requires any explanation, small as it is, this is perhaps a more likely one than any reference to sex differences. There is no consistent trend for values to increase with increasing age, except perhaps for L, and possibly for N. On the whole, these values are if anything higher than those obtained with the JEPI (S. B. G. Eysenck, 1965).

TABLE 1

TEST-RETEST RELIABILITIES : ONE MONTH'S INTERVAL.

Age	n	P	E	N	L
White girls					
11	31	·83	·84	·65	·78
12	42	·75	·82	·86	·82
13	43	·76	·79	·82	·92
14	45	·75	·88	·86	·89
Coloured girls					
11	17	·70	·87	·65	·95
12	20	·74	·73	·79	·92
13	38	·89	·75	·68	·92
14	8	·78	·55	·85	·88

TABLE 2

TEST-RETEST RELIABILITIES : ONE MONTH'S INTERVAL.

BOYS.

Age	n	P	E	N	L
12	58	·68	·83	·71	·59
13	84	·68	·75	·74	·79
14	48	·67	·77	·81	·79

Table 3 shows values for retests done after six months, for boys and girls separately. The number of 15-year-old girls is small, and the values in that row may be disregarded. Values are rather variable along both rows and columns, which makes it somewhat difficult to come to any general conclusion. Retest reliabilities are not lower for P than for the older established scales, and seem to centre around ·6 or so if we disregard the youngest group ; values for the 7-year-olds would seem to be rather lower, suggesting that perhaps many of them did not understand the questions too well. The 8- and 9-year-olds are a little below the older children, but not sufficiently so to make it inadvisable to test them ; for purposes of group comparison, and for experimental purposes, these values are not too low. Boys seem to be more reliably measured than girls as far as P is concerned ; this is in line with the higher scores and variances typically obtained by boys on this factor. E is more reliably measured in girls; for N and L the differences are very small. On the whole, it is doubtful if we can claim on the basis of these figures that there are any marked sex differences ; different teachers might account for any differences that appear.

TABLE 3

TEST-RETEST RELIABILITIES : SIX MONTHS' INTERVAL.

Age	n	P	E	N	L
Boys					
7	84	·38	·33	·34	·62
8	104	·51	·53	·34	·67
9	87	·43	·53	·74	·75
10	117	·65	·57	·71	·67
11	195	·59	·60	·74	·72
12	198	·71	·60	·70	·59
13	201	·64	·67	·72	·65
14	191	·76	·74	·66	·71
15	47	·81	·54	·77	·84
Girls					
7	88	·53	·44	·51	·65
8	81	·44	·54	·40	·61
9	104	·69	·58	·57	·77
10	102	·48	·73	·74	·74
11	184	·47	·60	·55	·73
12	198	·53	·74	·71	·72
13	176	·65	·76	·74	·66
14	176	·63	·78	·69	·75
15	28	·36	·82	·77	·83

Table 4 shows retest reliabilities for primary school children, the interval being 12 months ; figures for the 10-year-olds are based on very small numbers and may be disregarded. The 7-year-olds tend again to have the lowest values, and are probably handicapped in reading the questions. The other figures are rather variable, but centre around ·6, though some values fall well below this figure. Values for P are not any lower than for the better established scales. Considering that we are dealing with primary school children, the size of the reliabilities is not too disappointing, but it should be borne in mind when evaluating such findings as those reported by Eysenck and Cookson (1969, 1970) that the reported correlations between personality and achievement, say, require to be corrected for attenuation before the' true ' correlations can be properly estimated.

TABLE 4

Test-retest Reliabilities : 12 Months' Interval.

Age	n	P	E	N	L
Boys					
7	36	·53	·37	·48	·34
8	50	·43	·40	·51	·54
9	60	·44	·35	·58	·72
10	14	·32	·59	·64	·69
Girls					
7	46	·41	·50	·41	·53
8	64	·50	·47	·58	·66
9	64	·37	·61	·59	·66
10	8	·90	·58	·64	·51

The data suggest certain conclusions. (1) Retest reliabilities after the lapse of one month are high enough for secondary school children to use the test with some confidence as measures of present status. (2) Retest reliabilities for the new P scale are not very different from reliabilities for other scales, whatever the test-retest interval. (3) For longer test-retest intervals, reliabilities fall to around ·6 ; such low reliabilities suggest the need for correction for attenuation of correlations with personality variables, and the need for caution in interpreting cross-sectional data ; clearly longitudinal data are preferable. (4) Reliabilities for 7-year-olds are probably too low to place any confidence on scores obtained for children of that age ; 8- and 9-year-olds are in a better position, and although probably inferior to older children with respect to reliability of measurement it does not seem necessary to warn users against working with children of that age, provided numbers are large enough to cancel out chance variations. (5) The reliabilities of the new scales are very similar, and if anything a little higher, than corresponding reliabilities of the JEPI ; the fact that the latter has been used with some success by many investigators suggests that the new scales are sufficiently reliable to be used in the same manner. (6) Clearly much developmental change is taking place in the personality of these young children ; as in the case of the IQ, predictions of terminal status from scores in early childhood would be inappropriate.

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A RE-EVALUATION OF THE JUNIOR EYSENCK PERSONALITY INVENTORY

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SUMMARY. The JEPI was re-analysed by item, factor and cluster analysis. The item analysis demonstrated that many items in the extraversion scale do not discriminate effectively. Five factors and five clusters were extracted and related to attainment measures. The five factor solution explained 19 per cent of English attainment variance in comparison to 7 per cent by the JEPI as conventionally scored. The analysis also supported the view that extraversion is not a unitary dimension. The cluster analysis indicated the operation of response sets. Items of the lie scale appeared in different factors and clusters dependent on the specificity of reference in the item to a situational context. It is therefore suggested that inventories be developed in which items can be answered with reference to specific situations.

INTRODUCTION

SINCE its introduction the JEPI has been used extensively in educational research, as the recent review by Entwistle (1972) demonstrates. Despite this, the validity of the inventory remains in doubt since relationships with teacher ratings of personality have tended to be low (Eysenck and Pickup, 1968; Eysenck and Cookson, 1969). One explanation of these low relationships could be that the JEPI marking scheme, which is based on the contention that the dimensions are orthogonal, also assumes the scales to be homogeneous. Yet research on the adult form indicates that this is unlikely to be the case. Carrigan (1960), Eysenck and Eysenck (1963) and Howarth and Browne (1972) all suggest that at least two factors emerge from the extraversion scale, one emphasising sociability, and the other emphasising impulsivity and weak super-ego controls. Of particular concern for educational research is that these traits could have a different influence on academic attainment.

There is also doubt concerning item discrimination in the extraversion scale. S. B. G. Eysenck (1965) maintains that the distribution on this dimension is roughly normal, but the mean approaches 18 in a 24-item scale. This could indicate that a number of items are failing to discriminate effectively, thereby creating a lack of ceiling which is not apparent in the neuroticism scale.

Both Carrigan (1960) and Eysenck and Eysenck (1963) suggest that the extraversion factor also incorporates elements of adjustment, and imply a relationship between impulsivity and neuroticism. The original factor loadings reported in Eysenck and Eysenck (1969) support this. These indicate that a number of impulsivity items tended to load on the neuroticism factor. For example, item 57, ' When children shout at you, do you shout back? ' loaded more highly on the neuroticism factor at age 10, 11, 13 and 14, and equally on the neuroticism and extraversion factors at age 12; yet it is scored for extraversion.

Many studies have also reported moderate negative relationships between the lie and neuroticism scales in both adult and child samples (Gibson, 1967; Eysenck and Cookson, 1969a; Rump and Court, 1971; Bennett, 1972). It has thus been argued that the neuroticism scale is badly affected by the social desirability response set which the lie scale supposedly measures. But since all the neuroticism items require a YES response, this interaction could be explained in terms of the operation of acquiescence response set which Couch and Keniston (1960) maintain is related to social desirability response set. The meaning of the lie scale is still not clear, however. Although Eysenck, Nias and Eysenck (1971) maintain that a psychological source trait underlies the lie scale which is as strong as extraversion and neuroticism, the trait has been variously defined (Dicken, 1959 ; Gibson, 1964 ; Michaelis and Eysenck, 1971).

Previous research therefore suggests that interactions between the items of all three scales could be confounding not only the intercorrelation of the scales themselves but also the relationships with attainment measures. The present study assesses this by analysing the inventory by item, factor and cluster analysis.

DESIGN

Samples.

Three samples were used for the item analysis to assess age effects. These were :

(i) 330 boys and girls of mean age 10 years 3 months ;
(ii) 348 boys and girls of mean age 11 years 3 months ;
(iii) 319 boys and girls of mean age 12 years 3 months.

Samples (i) and (ii) were drawn from 22 classes in eight primary schools whose intake areas ensured diversity in social class and intellectual levels. Sample (iii) was drawn from a wide range of secondary schools to which the above primary schools were the principal feeders. All the samples were representative in terms of VRQ and their mean JEPI scores were not significantly different from the norms indicated in the handbook. Only sample (i) was used for the factor and cluster analyses. The attainment measures utilised in this study are teacher estimates of conventional English, usually derived from end of term tests, and independent assessments of imaginative stories, as a measure of creative attainment. A verbal reasoning test was also administered (cf. Bennett, 1973).

Procedure.

The inventory was marked by item, and thus the correlation matrix for the factor analysis was comprised of phi coefficients between dichotomous variables. The scree test (cf. Child, 1971) indicated the extraction of five factors which included all those having an eigen value in excess of two. This was also the limit chosen by Eysenck and Eysenck (1969) when re-factoring the adult EPI. The factors were rotated to simple structure by means of a varimax solution to assess the homogeneity and independence of the scales. An iterative relocation technique was used for clustering (Wishart, 1969). The five cluster solution was chosen since at this level the clusters were stable whilst retaining the greatest amount of information. Techniques for assessing stability and information loss are indicated in Brennan (1972).

RESULTS

Item Analysis.

The percentage occurrence of response to each item was computed separately for each of the three samples. At each age level they were almost identical. In each sample the same 12 items in the extraversion scale, 50 per cent, exhibited response rates in excess of 80 per cent. Nine of these had response rates in excess of 85 per cent. Lack of discrimination on such a large scale must inevitably create a lack of ceiling which is not apparent in the neuroticism scale, all the items in which exhibited response rates between 35 and 75 per cent. Two items in the lie scale also consistently failed to discriminate, these being 'Do you sometimes get cross?' and 'Have you ever told a lie?' The response rate for both was over 90 per cent in all three samples.

Factor Analysis.

The five factors extracted accounted for 26·5 per cent of the variance, which equates with the proportion accounted for by Gibson (1967) in his re-analysis of the Junior Maudsley Inventory. Factor 1 need not be shown here since it was composed of 22 of the 24 neuroticism items. The only deviant loading was an introversion item 'Are you shy at speaking first when you meet new people?' The four remaining factors are shown in Table 1 which lists those items with loadings in excess of 0·30, except where they help to define the factor.

TABLE 1

LOADINGS OF ITEMS IN FACTORS 2 TO 5 OF THE FIVE FACTOR SOLUTION.

Factor 2 Inhibited *v.* Impulsive			Factor 3 Sociable *v.* Unsociable		
Loading	Item No.	Designation in JEPI	Loading	Item No.	Designation in JEPI
·62	30	I	—·68	59	E
·51	36	L	—·61	51	E
—·51	57	I	·61	38	E
—·48	43	I	—·51	6	E
·44	24	L	·44	27	E
—·41	12	L	·35	1	E
·39	8	L	·29	25	E
—·35	9	I			
·34	28	L			
·34	39	N			
—·34	48	L			
—·34	50	S			
—·34	60	S			
Factor 4 Active *v.* Passive			**Factor 5** Phlegmatic *v.* Assertive		
·47	19	E	·52	8	L
·45	9	E	—·49	32	L
·45	49	E	·46	41	S/E
·44	11	E	·46	44	L
·42	14	E	—·44	40	L
·42	17	E	—·43	34	S
·40	53	E	·38	16	L
·37	25	E	—·36	56	L
·34	7	N	—·35	48	L
·33	3	E	—·33	26	S
·32	35	E	—·31	20	L
·29	27	E			

The highest loadings on factor 2 are from lie and introversion items. These appear to denote timidity and conforming behaviour, especially in relation to school since the three lie items with the highest loadings have a specific situational context. This factor appears to equate with what Adcock (1965) has called ' inhibited,' and at the positive pole is similar to a factor gained by Gibson (1967), which he called ' boldness,' although ' impulsive ' appears to be a more accurate label.

Factor 3 is composed of many of those extraversion items which failed to discriminate in the item analysis. Thus, unlike the other factors, it exhibited a highly skewed distribution when factor scores were derived. The highest loadings are from items relating to parties and meeting people, and appears to denote the sociability aspect of extraversion.

Factor 4 is also almost completely composed of extraversion items, but the accent is more on activity and movement, including such items as 'Are you rather lively ? ' and ' Do you like doing things when you have to act quickly ? ' The factor has therefore been labelled ' active *versus* passive.'

Factor 5 illustrates the interaction between stability and lie items. All the lie items in this factor are of a general nature in contradistinction to those appearing on factor 2. Gibson found a similar factor in his analysis of the JMPI and discovered that children scoring highly on the factor were rated ' well-behaved ' by teachers.

Cluster analysis.

Whereas factor analysis groups items together based on their intercorrelation, cluster analysis creates groups of people based on the similarity of their inventory response profiles. The group is defined by the items which best characterise the central stereotype of the group. Brennan (1972) provides a thorough review of the method. Items which best characterised each cluster are shown in Table 2.

TABLE 2

ITEMS WHICH CHARACTERISE THE FIVE CLUSTERS.

Cluster 1 (N=73) Assertive			Cluster 2 (N=101) Moody			Cluster 3 (N=48) Sociable		
Response	Item No.	Designation	Response	Item No.	Designation	Response	Item No.	Designation
No	39	S	Yes	26	N	Yes	24	L
—	8	L(–)	—	5	N	—	19	E
—	21	S	—	10	N	—	17	E
—	44	L(–)	—	60	N	No	51	E
—	36	L(–)	—	54	N	—	59	E
—	52	L(–)	No	8	L(–)	—	6	E
			—	36	L(–)	—	13	S
						—	55	E
Cluster 4 (N=51) Inhibited			Cluster 5 (N=56) Phlegmatic			Cluster 5 (contd.)		
Yes	39	N	Yes	8	L	No	48	L
—	36	L	—	36	L	—	10	S
—	51	I	—	24	L	—	58	S
—	59	I	—	16	L	—	40	L
—	8	L	No	26	S	—	32	L
—	21	N	—	47	S	—	13	S
—	28	L	—	39	S	—	52	S
—	33	I	—	42	S	—	60	S
—	42	N	—	21	S	—	23	S
—	55	I	—	59	E	—	5	S
—	24	L	—	56	S	—	50	S
			continued in next column					

Cluster 1 contains all NO responses to stability and lie items, the latter again having a situational context. This sort of denial response has been linked in other studies with defiant boasting and admitted naughtiness, particularly among boys. Perhaps significantly there are many more boys in this cluster than girls. The cluster has tentatively been labelled 'assertive.'

Cluster 2 is composed of a mixture of neuroticism and lie items and appears to delineate a group of children who admit to mood fluctuation and touchiness. Howarth and Browne (1972) reported a similar factor in the EPI.

Cluster 3 is very similar to factor 3 since the items characterising the group refer to parties and meeting people. It has therefore been given the same name.

Cluster 4 appears to delineate the conforming neurotic introvert. Eysenck has suggested such a syndrome which is similar to the 'inhibited' factor proposed by Adcock. It may be significant that all the items characterising this group require a YES response, and could indicate the operation of acquiescence response set. Indeed, clusters 1 and 4 could be interpreted in terms of 'yea sayers' and 'nay sayers' (Couch and Keniston, 1960).

Cluster 5 is superficially similar to factor 5 since both are composed of stability and lie items, the latter again having a general, rather than a situational context. There are many more stability items however, and it appears to be a combination of factors 1 and 5, and reflects the negative correlation always reported between the neuroticism and lie scales.

Relationships with attainment.

Factor scores were derived from the five factors and correlated with the attainment measures. These correlations, together with the correlations exhibited by the conventional three factor solution, are set out in Table 3.

TABLE 3

CORRELATION OF FIVE AND THREE FACTOR SOLUTIONS WITH ABILITY AND ATTAINMENT MEASURES.

	Verbal Reasoning	English	Creative Writing
A. Five factor solutions :			
1. Neurotic	—·18	—·14	—·03
2. Inhibited	·06	·04	—·02
3. Unsociable	—·18	—·18	—·08
4. Active	·17	·20	·14
5. Phlegmatic	—·20	—·16	—·21
B Three factor solution :			
1. Neuroticism	—·17	—·12	—·02
2. Extraversion	·16	·13	·11
3. Lie	—·13	—·16	—·19

Significance levels :
P>·05=0·11 ; P>·01=0·14

In relation to both VRQ and English attainment, four of the five factors exhibit correlations as great, or greater than those of the three factor solution, all but one are in excess of the ·01 level. Personality factors are less involved in creative writing (Rudd, 1970; Bennett, 1972), and this is reflected in the lower correlations. Nevertheless, two of the five factors correlate significantly in excess of the ·01 level.

The difference between the two solutions is best seen in a multiple regression analysis. The equations for the five factor and three factor solution respectively, for conventional English attainment were:

(1) —·46 Phlegmatic+·24 Inhibited—·22 Neurotic+·20 Active—·10 Unsociable+35·2
$r=0{\cdot}44 \qquad r^2=0{\cdot}19$

(2) ·11 Extraversion —·18 Neuroticism—·21 lie+39·3
$r={\cdot}26 \qquad r^2={\cdot}07$

The five factor solution explains 19 per cent of the attainment variance compared with only 7 per cent by the JEPI as conventionally marked. In explaining this proportion of variance the five factor solution is a better predictive instrument than Cattell's Children's Personality Questionnaire which is over twice as long, and has three times the number of factors (Bennett, 1972). Factor 5—Phlegmatic, containing stability and lie items, has the greatest beta weight in the five factor solution, and the lie scale in the three factor solution. Both, therefore, demonstrate the effectiveness of the lie scale in predicting attainment. The regression equations for creative attainment were very similar with the five factor solution explaining twice as much of the criterion variance as the three factor model.

In order to assess the five factor model in terms of mean scores, and to investigate possible regression effects, the distributions of all the factor scores were split at half a standard deviation above and below the mean, creating a high, average, and low group on each factor. The mean scores for VRQ, English and creative writing were then computed for each group, and these are set out in Table 4.

TABLE 4

JEPI FACTORS AND ABILITY/ATTAINMENT MEASURES.

Factor	Verbal Reasoning	English	Creative Writing
Neurotic	101·1	31·9	6·7
Average	105·5	36·6	6·8
Stable	108·8	37·4	6·8
Inhibited	105·5	35·7	6·4
Average	107·5	37·3	7·1
Impulsive	102·6	33·2	6·9
Unsociable	99·0	29·6	6·1
Average	105·6	35·8	7·0
Sociable	109·6	39·6	7·2
Active	110·0	39·5	7·5
Average	102·9	33·5	6·5
Passive	101·3	31·8	6·2
Phlegmatic	99·9	30·1	5·8
Average	105·8	34·9	6·8
Assertive	108·5	40·2	7·7

In each ability/attainment area, activity, sociability and assertiveness distinguish the high performing groups, whereas unsociability and phlegmatism delineate the poor performers. All the regressions are approximately normal with the exception of the inhibited—impulsive dimension which displays curvilinearity with all the measures. The nature of the non-linearity is such that average levels of impulsivity are more advantageous for performance.

Table 5 sets out the mean scores of the groups defined by cluster analysis.

TABLE 5

JEPI CLUSTERS AND ABILITY/ATTAINMENT MEASURES.

Cluster	Verbal Reasoning	English	Creative Writing
Assertive	106·0	36·9	6·8
Moody	103·0	34·1	7·1
Sociable	116·1	34·0	7·9
Inhibited	97·0	29·1	5·8
Phlegmatic	104·8	33·0	6·0

It is evident that the sociable group is outstanding in terms of performance. Their scores on an academic motivation inventory, not reported here, indicated a genuine orientation to academic values, and this is reflected in their response to the lie scale item referring to homework. The group of assertive children perform well on most measures despite their apparent lack of concern with school values. The inhibited children generally perform badly, and together with the phlegmatic group perform worst in both attainment measures, although the former have a significantly higher mean VRQ.

DISCUSSION

The general hypothesis that the marking scheme of the JEPI could be masking interactions between the items of the scales, and decreasing the effectiveness of the scales in explaining attainment variance, appears to be supported.

It is evident that extraversion is not a unitary dimension since extraversion items helped to define three of the five factors extracted. One of these, ' inhibited—impulsive,' displayed curvilinear relationships with all attainment measures. This would indicate that sociability and impulsivity do, as presumed, have a different effect on attainment. The extraversion scale also requires modification to overcome the lack of discrimination of many of the items. In addition to creating a lack of ceiling, this could artificially improve the internal consistency and test-retest reliability of the scale.

The operation of response sets is indicated by the cluster analysis. Cluster 5 is composed of stability items, and those lie items of a general nature. It would therefore appear that the general tendency to lie, or present a favourable self picture, is associated with low scores on the neuroticism scale. This would account for the negative relationship usually found between the two scales. Acquiescence response set could also be operating since clusters 1 and 3 can be interpreted in terms of ' Yea-sayers ' and ' Nay-sayers.' According to Couch and Keniston (1960) the former are emotional, openly admit anxiety, and exhibit a 'pervasive unwillingness to respond to impulsive or environmental forces,' whilst the latter are calm and stable. These are also the behaviours indicated by the items characterising the two clusters. This interpretation lends support to Mischel's (1968) suggestion that relationships between items or questionnaires may be due not so much to the presence of traits as to the operation of common response sets.

The results demonstrate the effectiveness of the lie scale in predicting school attainment, and is worthy of further development. The form that this should take is confounded by the fact that items loaded on separate factors and clusters dependent on the specificity of reference to a situational context. This could suggest that items of a general nature, which make up the greater part of the JEPI, could be more prone to response error since different situational reference points can be chosen by different children in responding to the same item. Small scale studies at Lancaster, in which children were interviewed after completing the JEPI, support this view. Combined with the conventional marking scheme, this could be among the factors contributing to the low validity of the inventory.

Validity may be improved if inventories are developed which incorporate the assessment of both trait and situational elements. Few of this type exist although Endler, Hunt and Rosenstein (1962) and Argyle and Little (1972) have developed scales along these lines. In the present context a start could be made by adapting a group of items from existing trait measures which could be answered with reference to a variety of specific situations, e.g., the classroom, playground, and so on. In this way, responses, situations, and individual differences, could be separately sampled, permitting the assessment of their relative contribution to the attainment variance and their interaction.

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EFFECTS OF RESPONSE ANONYMITY ON ASSESSMENT OF OWN AND SCHOOL VALUE SYSTEMS AND SATISFACTION WITH SCHOOL

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SUMMARY. Subjects in a boys' school and a girls' school completed modified forms of the Rokeach Value Survey, the Cornell Job Description Index, and a rating of happiness with school under name and anonymous conditions. Results indicated that response anonymity had little effect on the ranking of values although being *independent* was ranked higher by the boys in the name condition than in the anonymous condition. In the name condition boys gave more favourable responses to class-mates and the typical teacher and reported greater happiness with school, but girls in the name condition were less favourable to schoolwork and reported less happiness with school. Two quite distinct factors emerged from a factor-analysis, Factor I corresponding to students' own value systems and Factor II corresponding to the perceived value systems of their schools.

INTRODUCTION

IN administering assessment devices one is often confronted with the problem of whether respondents should be asked to identify themselves by putting their names at the top of the test or whether they should respond anonymously, perhaps by using a designated code number if other tests are to be given or no identification at all if only the one test is to be administered. In deciding this question one usually tries to weigh the possibility that the respondent will not take the test seriously if he is required to answer anonymously against the possibility that he will be more likely to fake his answers if he is asked to record his name. In addition one is guided by those general ethical considerations that concern the need to guarantee the privacy and welfare of the individual.

The main aim of the present study was to investigate whether response anonymity would affect how school children ranked the importance of values on the Rokeach Value Survey, how they answered a modified form of the Cornell Job Description Index (JDI) in which they checked statements concerning *schoolwork*, *people in my class*, and *the typical teacher*, and how they rated their happiness at school. No firm predictions were made about differences in value rankings obtained under anonymous conditions and rankings obtained under a condition where subjects put their names at the top of the Value Survey (the name condition). One might speculate that subjects in the name condition would be more likely to provide socially desirable answers but it is difficult to guess what the socially desirable responses would be for a test that involves ranking a set of values in their order of importance. School children may feel, however, that they have freer rein to criticise their teachers, school work and class-mates, and to report unhappiness at school under conditions of anonymity. Under the name condition such criticism could be sheeted home to them and, in a school situation where the social structure is fairly hierarchical and authoritarian, they may therefore expect that their negative comments would react against them. Furthermore, under the name condition school children may believe that favourable answers about school would lead to social approval. Hence it was predicted that responses concerning aspects of the school situation and happiness with school would be more favourable under the name condition than under the anonymous condition.

It was decided to investigate the effects of response anonymity in both a boys' school and a girls' school since there is accumulating evidence of important differences between the sexes in regard to personality and role perceptions. For example, the available research suggests that girls are more dependent on and acceptant of authority than boys and that their self-esteem is more closely bound up with how others evaluate them (see Bardwick, 1971). In the present context such differences imply that girls might be rather less critical of authority figures within their school and that response anonymity might therefore have little effect on how they describe their teachers.

METHOD

Subjects and Schools.

The present study formed part of an extensive survey involving nearly 3,000 school children attending their last two years of secondary school education (Leaving and Matriculation Classes) in 19 schools in the metropolitan district of Adelaide (Feather, 1972a, 1972b, 1972c). In two of these schools it was possible to administer the survey under both anonymous and name conditions in the same test session. In each case the room where the survey was administered was divided by a wide central corridor with seats on either side. As subjects entered the room they were assigned to one side of the room or the other in a random fashion. Subjects on one side of the room then received the anonymous form of the test while those on the other side of the room were required to put their names on the top. There was no possibility of communication from one side of the room to the other.

Both schools involved in the study were fee-charging, single-sex colleges outside of the control of the State Government and administered by an independent organisation, in each case associated with a particular church. The boys' school was an Anglican college and 263 subjects from Leaving and Matriculation classes were tested (41 per cent of the boys were in their final year). Of these subjects, 127 boys completed the survey under the name condition and 136 under the anonymous condition. Mean age of the boys was 16·62 years and the mean number of years they reported they had attended their school was 5·91 years. The mean status of their fathers' occupations was 3·26 where the measure of status was based upon each subject's description of his father's occupation and used the scale devised by Congalton (1969) for the prestige ranking of occupations in Australia (scored 1–7 in the direction of *decreasing* prestige). All of the boys were tested together at the same time in a large assembly hall with some of their teachers (males) present to assist in test distribution. The girls' school was a Catholic convent and 155 subjects from Leaving and Matriculation classes were tested (43 per cent of the girls were in their final year). There were 77 girls involved in the name condition and 78 in the anonymous condition. Mean age of the girls was 16·65 years and the mean number of years they reported they had attended their school was 5·86 years. The mean status of their fathers' occupations was 3·68, again using the Congalton index. The girls were tested in a science laboratory. Girls in the Leaving classes were tested first, immediately followed by the girls in their final year (Matriculation classes). Some of their teachers (females) were present to assist in test distribution. In neither school were there any significant mean differences between the name and anonymous conditions in regard to age, number of years at school, or status of fathers' occupation. Indeed, the means were very similar and attest to the success of the random allocation of subjects to the two conditions. Status of fathers' occupation was, however, significantly higher in the boys' school than in the girls' school ($P < \cdot 01$).

Test Administration.

The questionnaire was introduced as an educational survey. On the cover page subjects were told to read the instructions carefully, to work quickly, quietly, and independently, and to give their own honest opinions. Subjects in the name condition were told that names, age, etc., were required but that all information was treated confidentially. Subjects in the anonymous condition were told that there was no need for them to put their names at the top of the form, that names were not required. Again it was stressed that all information obtained was confidential. On the next page of the survey subjects were presented with a number of questions designed to obtain background information. A space for the subject's name was provided at the top of the page in the name condition but not in the anonymous condition.

After completing background information about age, class in school, number of years the student had been at school, father's occupation, type of student (Leaving or Matriculation), recent examination grades, and vocational plans after leaving school, each subject answered a modified form of the Rokeach Value Survey. In its usual form subjects are required to rank 18 *terminal* values in their order of importance to them and then to rank 18 *instrumental* values, again in regard to how important they are for self. The 18 terminal values and 18 instrumental values are listed in Tables 1 and 2 respectively. In the present survey there was not sufficient time available to permit subjects to rank both sets of values so the questionnaires were randomly distributed so that approximately half the subjects ranked the terminal values only while the remaining subjects ranked the instrumental values only.

Subjects ranked the set of values in two ways, first in relation to self, then in relation to the school they attended. The first set of instructions asked subjects to study the list of 18 values carefully then to place a 1 next to the value " . . . which is most important to you, place a 2 next to the value which is second most important to you, etc. The value which is least important, relative to the others, should be ranked 18." They were told to " . . . take all the time you need to think about this so that the end result is a true representation of *your* values."

The second set of instructions asked subjects to " . . . assume that your school is attempting to turn out children with certain kinds of values, some of which the school considers to be more important than others." They were then asked to " . . . think of a student who has these values that the school strives to emphasise and think of the order in which the school would emphasise them." They then ranked the values from 1 to 18, according to how they thought the school would emphasise them from most important to least important. They were told to " . . . take all the time you need to think about this so that the end result is a true representation of the values in the order your school emphasises them." The values were presented as in Form E of the Value Survey, that is alphabetically with each value followed by a short descriptive phrase and a space for the rank to be written beside it (Rokeach, 1971). The descriptive phrases have been presented in previous publications (Feather, 1970a ; Rokeach, 1968). In making the rankings subjects were requested not to use the same number twice or to leave any blanks. A very small number of subjects had to be excluded because of errors in ranking (less than 4 per cent of the total number). The sets of rankings provided by subjects for self and then for school will be referred to as *own value systems* and *school value systems* respectively.

When they had finished the two sets of rankings subjects completed a modified form of the Cornell Job Description Index (Smith, Kendall, and Hulin, 1969) applied to the school situation. This modified JDI required subjects to check lists of 18 items as they applied to *school work*, *people in my class*, and *the typical teacher*. The items were those used in the original form of the JDI and subjects were asked to indicate whether each item in each scale described what that scale referred to (school work, people in my class, typical teacher), whether it did not, or whether they could not decide. For example, some of the items describing *school work* were as follows: fascinating, routine, satisfying, boring, good, . . . , simple, endless, gives a sense of accomplishment; some of the items describing *people in my class* were: stimulating, boring, slow, ambitious, stupid, . . . , narrow interests, loyal, hard to meet; and some of the items describing *the typical teacher* were: hard to please, impolite, praises good work, tactful, influential, . . . , leaves me on my own, around when needed, lazy. Separate satisfaction scores were obtained for each of these three aspects of the school situation based upon the JDI keys. The procedure described by Smith (1967, pp. 346-349) was employed in which the score for each sub-scale is obtained by simply adding up the number of responses within each scale, according to the keys provided. Hence for each sub-scale the scores could range from 0 to 18 in the direction of increasing job satisfaction. In addition to obtaining scores for the three sub-scales, a total satisfaction score was obtained involving the sum of the separate satisfaction scores.

Finally, subjects were asked to rate how much they enjoyed being at school. They did this by putting a cross on a 5-inch scale labelled " Very happy at school " at one extreme, " Don't like school at all " at the other extreme, and " Moderately happy at school " in the middle of the scale. Responses were scored from 1 to 9 in the direction of increasing happiness, with a score of 5 spanning the mid-point of the scale.

Form of Analysis.

One of the main aims of the survey as a whole was to examine the hypothesis that students whose own values matched those they saw their schools as emphasising would be more satisfied with aspects of the school situation and happier with school than students whose own values clashed with the perceived values of their school. It was for this reason that subjects were required to provide two sets of value rankings as indicated above. The results of the overall survey supported this general hypothesis. They have been presented previously and discussed in relation to the concept of person-environment fit and discrepancy theory (Feather, 1971a, 1972a, 1972b, 1972c). In the present context, where the effects of response anonymity were the main concern, some of the analytic procedures developed in relation to the testing of the general hypothesis were again employed. An index of similarity between own and school values was obtained for each subject by transforming the ranks from 1 to 18 to z scores corresponding to a division into 18 equal areas under the normal curve (Hays, 1967, pp. 35-39). This transformation was made on the assumption that differences between ranks at the extremes would be more discriminable than differences between ranks in the middle of the scale. For each subject the transformed rankings for own values were then correlated with the transformed rankings for school values using product-moment correlation. A high correlation would indicate a high degree of similarity between own and school value rankings. Thus, each subject had a similarity index involving either terminal values or instrumental values (own with school values) and these indices were compared across name and anonymous conditions within the boys' school and within the girls' school using the analysis of variance.

As in previous studies median rankings for each set of values in each condition were obtained (Feather, 1970a, 1970b, 1971b). The inter-correlations between the sets of median rankings (average value systems) were factor-analysed (see also, Feather, 1972c). The rankings of particular values across name and anonymous conditions were compared within each school. To do this, 2 × 2 analyses of variance were applied to the transformed rankings for each value with Anonymity (present or absent) and Type of Ranking (own or school) as the two factors in each analysis, and with repeated measures on the second factor (Winer, 1962). Finally, measures of satisfaction with the three aspects of the school situation and ratings of happiness with school were compared across name and anonymous conditions within each school using simple one-way analysis of variance.

RESULTS

Analysis of Value Systems and Individual Values.

Tables 1 and 2 present the median rankings in the boys' and girls' schools of terminal and instrumental values respectively in relation to own and school rankings and to name and anonymous conditions. Each column in Tables 1 and 2 therefore indicates the average *value system* for the particular condition represented by that column.

TABLE 1

MEDIAN RANKINGS OF TERMINAL VALUES IN BOYS' SCHOOL AND GIRLS' SCHOOL FOR NAME AND ANONYMOUS CONDITIONS.

Terminal Value	Boys				Girls			
	Own Values		School Values		Own Values		School Values	
	Name (1)	Anonymous (2)	Name (3)	Anonymous (4)	Name (5)	Anonymous (6)	Name (7)	Anonymous (8)
A Comfortable Life ..	9·50	6·50	8·64	9·88	14·25	14·00	13·30	14·88
An Exciting Life	6·00	5·50	11·36	12·90	10·60	10·25	15·13	13·38
A Sense of Accomplishment	7·00	6·88	1·59	3·50	9·00	7·17	4·90	4·90
A World at Peace	6·00	7·63	7·83	8·75	5·00	6·67	4·50	6·50
A World of Beauty	12·83	12·30	11·94	11·42	10·00	13·00	12·83	11·88
Equality	10·00	11·88	6·75	6·17	4·71	5·33	5·75	4·88
Family Security	7·50	7·50	10·38	9·42	6·00	7·50	8·42	7·36
Freedom	6·17	5·56	9·06	10·25	6·67	4·50	8·83	8·25
Happiness	6·13	5·21	8·75	8·92	7·00	6·33	9·63	9·25
Inner Harmony	10·75	11·28	9·81	10·13	7·00	9·00	6·25	7·38
Mature Love	6·86	6·25	13·94	13·28	7·00	10·00	13·50	13·50
National Security	14·23	14·38	14·63	11·72	13·67	13·50	12·50	12·88
Pleasure	9·50	9·38	11·81	13·58	14·50	15·29	14·13	14·50
Salvation	15·17	15·69	6·50	4·83	11·50	12·60	3·13	1·70
Self-Respect	11·50	10·88	7·50	5·83	10·00	10·00	5·50	8·50
Social Recognition	14·33	12·17	7·50	5·63	15·50	13·75	12·17	10·83
True Friendship	4·50	4·88	5·79	6·63	6·00	3·50	7·83	8·07
Wisdom	7·00	9·75	2·77	4·30	4·75	6·20	3·10	2·88

NOTE—In each column low numbers denote high relative value.

TABLE 2

MEDIAN RANKINGS OF INSTRUMENTAL VALUES IN BOYS' SCHOOL AND GIRLS' SCHOOL FOR NAME AND ANONYMOUS CONDITIONS.

Instrumental Value	Boys				Girls			
	Own Values		School Values		Own Values		School Values	
	Name (1)	Anonymous (2)	Name (3)	Anonymous (4)	Name (5)	Anonymous (6)	Name (7)	Anonymous (8)
Ambitious	7·25	5·00	3·75	3·10	7·50	5·00	4·00	5·25
Broadminded	6·60	7·00	10·83	10·92	8·13	7·00	11·33	12·50
Capable	7·60	7·70	7·50	8·63	10·75	10·50	7·00	8·50
Cheerful	8·67	8·00	14·14	13·50	8·30	7·33	10·75	13·38
Clean	10·17	10·83	8·50	6·17	12·19	10·57	12·00	9·30
Courageous	9·80	12·25	12·92	14·32	8·25	8·33	12·00	11·63
Forgiving	10·33	9·33	12·75	12·90	8·30	10·33	12·00	13·30
Helpful	11·40	10·25	10·65	8·79	7·75	8·33	9·00	8·25
Honest	4·00	5·20	7·13	4·90	2·75	2·00	3·75	4·13
Imaginative	14·22	13·33	13·58	13·44	13·75	12·40	14·88	12·93
Independent	6·71	10·60	9·17	13·10	11·25	12·00	12·00	12·13
Intellectual	12·00	11·67	4·63	7·38	11·90	11·67	8·67	10·17
Logical	9·00	10·75	7·38	10·25	12·83	11·50	9·75	9·17
Loving	9·80	9·71	16·45	15·31	7·25	6·80	15·25	15·88
Obedient	11·00	10·88	4·85	5·14	10·83	13·00	3·33	3·90
Polite	8·33	9·20	5·17	4·17	10·17	11·00	5·00	6·13
Responsible	4·57	5·10	4·41	4·41	4·75	3·50	3·56	3·10
Self-Controlled	7·75	6·70	6·94	6·94	6·13	8·00	5·50	4·92

NOTE—In each column low numbers denote high relative value.

TABLE 3

FACTOR SATURATIONS FOR THE EIGHT AVERAGE TERMINAL VALUE SYSTEMS IN TABLE 1 AND THE EIGHT AVERAGE INSTRUMENTAL VALUE SYSTEMS IN TABLE 2.

Average Value System or Column	Factor Saturations			
	Terminal Values		Instrumental Values	
	Factor I	Factor II	Factor I	Factor II
1	—·08	·96	·25	·77
2	—·25	·88	·32	·88
3	·85	—·09	·96	·04
4	·91	—·12	·94	·16
5	·54	·68	·10	·90
6	·58	·75	—·05	·95
7	·96	·01	·91	·25
8	·94	·08	·93	·17
Percent of Variance	50·87	34·29	45·97	40·22

The average value systems in the columns in Table 1 were intercorrelated using the Spearman rank-order procedure to yield an 8 × 8 matrix for the terminal values. Similarly, the columns in Table 2 were intercorrelated using the Spearman rank-order procedure to yield an 8 × 8 matrix for the instrumental values. These correlation matrices were separately factor-analysed using the principal components method in conjunction with varimax rotation for eigen values greater than one. The results of these factor-analyses are presented in Table 3 which lists the factor saturations associated with each of the eight average value systems in Table 1 (terminal values) and Table 2 (instrumental values).

Table 3 indicates that in each analysis two factors emerged. The first factor can be clearly identified as a school values factor indicating a basic similarity in the median rankings of school values across all conditions. This factor accounted for 50·87 per cent of the variance in the analysis of the terminal value systems and 45·97 per cent of the variance in the analysis of the instrumental value systems. The second factor can be clearly identified as an own values factor indicating a basic similarity in the median rankings of own values across all conditions. This factor accounted for 34·29 per cent of the variance in the analysis of the terminal value systems and 40·22 per cent of the variance in the analysis of the instrumental value systems. The two factors together accounted for about 85 per cent of the variance in each analysis. No factors emerged that distinguished average value systems between the name condition and the anonymous condition or between the boys' school and the girls' school.*

The 2 × 2 analyses of variance applied to the transformed rankings for each value showed that there was little evidence that anonymity had much effect on the rankings of particular values. If, in view of all the comparisons being made, one adopts a fairly conservative level of significance and accepts differences as significant if $P < \cdot 01$ or $P < \cdot 001$ then only one main effect was significant: in the boys' school ***independent*** was ranked as more important in the name condition than in the anonymous condition, irrespective of whether subjects ranked for self or for school. There were also two significant interaction effects: in the boys' school ***clean*** and ***salvation*** were ranked relatively high in importance in the anonymous condition when rankings were made in regard to the school's priorities. Neither of these effects was significant in the analysis of data from the girls' school.

Finally, the analysis of the similarity indices indicated that in the boys' school the mean ***terminal*** similarity index was higher in the name condition than in the anonymous condition ($P < \cdot 01$). That is, when the boys were asked to put their names at the top of the questionnaire their own order of priorities for the terminal values more closely resembled the priorities they saw their school as having, than when answers were anonymous. This effect did not occur in the girls' school, however, nor were there any significant differences in either school when the mean instrumental similarity indices were compared across name and anonymous conditions.

In summary, there was very little evidence from the analyses of value systems, individual values, and similarity indices that response anonymity had much effect on value rankings. The overwhelming differences that occurred were related to whether the rankings were made for self or for school rather than to whether they were or were not anonymous.

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* When the factor-analysis was extended to take out three factors and to go below eigen values of one, Factor II split up into two factors for both the analysis of the average terminal value systems and the analysis of the average instrumental value systems: Factor IIA identifiable as an own values factor for the boys' school and Factor IIB identifiable as an own values factor for the girls' school. The three factors accounted for about 92 per cent of the variance in each case.

Analysis of Satisfaction Scores and Happiness Ratings.

Table 4 presents the mean satisfaction scores and happiness ratings for the boys' school and the girls' school in relation to the name and anonymous conditions.

TABLE 4

MEAN SATISFACTION AND HAPPINESS SCORES FOR BOYS AND GIRLS TESTED UNDER NAME AND ANONYMOUS CONDITIONS.

Type of School and Anonymity Condition	Mean Happiness Rating	Mean Satisfaction Scores			
		School-work	People in My Class	Typical Teacher	Total
Boys' School					
Name	5·81	8·89	11·36	11·36	31·67
Anonymous	5·10	8·33	10·35	10·53	29·21
Girls' School					
Name	5·46	8·20	10·44	11·50	30·32
Anonymous	6·22	9·23	10·73	11·73	31·69

NOTE—Mean total satisfaction scores were not exactly equivalent to the sum of the mean component scores since a small number of subjects did not complete all three subscales of the JDI.

Analyses of variance indicated that, in the boys' school subjects in the anonymous condition reported less satisfaction with *people in my class* ($P < \cdot 05$), less satisfaction with *the typical teacher* ($P < \cdot 05$), and provided lower ratings of happiness with school ($P < \cdot 01$) than did subjects in the name condition. In the girls' school, subjects in the anonymous condition reported more satisfaction with *schoolwork* ($P < \cdot 05$) and provided higher ratings of happiness with school ($P < \cdot 05$) than did subjects in the name condition, but there were no other significant differences. Thus, the results indicated some interesting differences between the boys' school and the girls' school in the effects of anonymity on measures of satisfaction with aspects of the school situation and ratings of happiness with school.

DISCUSSION

There was little evidence that response anonymity had much effect on how subjects answered the Value Survey either in regard to their own priorities or those of their school. What differences there were occurred for the boys and not for the girls. Being *independent* (self-reliant, self-sufficient) was ranked higher in importance when the boys were asked to put their names at the top of the questionnaire than when they were not. These children may have seen independence as an important mark of maturity, a style of behaviour expected to emerge as boys grow older. They may, therefore, have expected social approval for assigning a relatively high value to being independent, particularly from adults who generally value self-sufficiency in the male and who usually try to guide boys in the direction of becoming self-reliant. The socially approved response (ranking *independent* as relatively high in importance) would be more likely to occur in the name condition. A response designed to elicit reward or social approval would be singularly ineffective if the response could not be identified with a particular person. The name condition in the present study allowed such identification: ' good ' answers could be related by others to the person who gave them. The fact that a similar difference in the ranking of *independent* was not found for girls was hardly surprising. Our culture as interpreted by parents to their children probably places less emphasis on developing independence and self-sufficiency in girls. Actions that display independence and self-reliance are looked for and fostered in boys as they grow to maturity and learn the masculine role. But the feminine role probably emphasises the other side of the coin: girls are usually more dependent than boys (Bardwick, 1971). Independence in girls does not attract the same degree of social approval as does independence in boys. The current concern with women's liberation attests to this fact.

Sex differences also occurred in regard to the effects of response anonymity on the assessment of satisfaction with aspects of the school situation and happiness at school. The boys in the anonymous condition were more likely to be critical of their class-mates and their teachers and to report that they were less happy at school than were the boys in the name condition. In the anonymous condition the boys could afford to be more critical since there was no risk of reprisals, answers could not be identified and subjects had free rein to express negative opinions if they wanted to. In the name condition where responses were somewhat more favourable to school the desire to win approval may again have been a salient concern since socially approved answers could be directly attributed to the person responsible for them. The greater readiness to be critical of class-mates and teachers under the anonymous condition was not, however, evident among the girls. As suggested previously, they may have been more acceptant of authority, more willing to follow the rules and the dictates of their teachers and therefore less likely to criticise them even when such criticism could not be associated with them by name. The girls did report more satisfaction with *school work* under anonymous conditions, however, and provided higher ratings of happiness with school when their answers were anonymous. These effects are not easy to interpret in the absence of further information and require replication since they were at a low level of significance. Perhaps there was a prevailing norm in the girls' school against admitting to liking school work and school, a norm that could be violated under anonymous conditions. Such a norm could be sex-related since girls in later adolescence might be diffident about appearing too interested in their studies, regarding competition and achievement as more the province of the male as he prepares for a vocation and the masculine responsibilities of adulthood (Bardwick, 1971 ; Horner, 1969).*

Despite the evidence that response anonymity had little effect on how subjects ranked terminal and instrumental values, it would be premature to conclude that this result could be generalised to all situations. In the first place, only two schools were involved in the present study. A more extensive survey examining the effects of the experimental manipulation of response anonymity in a wider range of schools would be worth attempting. A wider survey would have the advantage of enabling one to sort out the effects of different factors (e.g., sex *versus* school; church schools *versus* secular schools; single-sex schools *versus* co-educational schools, etc.) which can become confounded in a more limited study such as the present one.

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* In the survey as a whole girls tended to report more satisfaction with *people in my class* than did boys and to provide higher ratings of happiness with school than did boys (P< ·001). But there were no sex differences in regard to satisfaction with *schoolwork* and the *typical teacher* in the overall study. Also in the total survey, boys in single-sex schools were least satisfied with class-mates when compared to girls in single-sex schools and with boys and girls in co-educational schools (P< ·01).

Secondly, further investigations might look at situations in which the subjects' responses would be expected to lead to positive or negative consequences. For example, one can easily imagine situations where certain values might be ranked high in the interests of attaining rewards or avoiding punishments. An applicant for a job in a highly competitive industrial firm might, for example, rank *a sense of accomplishment* and *ambitious* high if the survey were being used for selection purposes. Similarly, an employee who wished to be transferred to another section in a large industrial complex might provide low satisfaction scores on the JDI. Such deliberate faking would be unlikely to occur under conditions of response anonymity since answers could not then be attributed to the individuals responsible for them. The name identifies the person responsible for the answers and rewards and/or punishments consequential upon these answers can then flow to him. Rosen (1961) has briefly reviewed research on the effects of anonymity (or lack of it) on subjects' responses to attitude questionnaires and personality inventories. His own study indicated very small effects which were of little practical significance, but it was acknowledged that distortion of answers may occur in some real-life settings under conditions where subjects could be identified by name (e.g., the study of military personnel described by Elinson and Haines, 1950). This should not be surprising in view of the plentiful evidence that subjects are quite able to fake their responses to questionnaires so as to provide socially desirable answers or to create a desired impression (Anastasi, 1968, pp. 456-458). Whether anonymity or lack of anonymity has an effect on subjects' responses would therefore depend very much upon the goal structure of the test situation, particularly upon the rewards and/or punishments contingent upon the answers given.

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STREAMING IN ENGLISH PRIMARY SCHOOLS

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INTRODUCTION

There is no shortage of research on ability grouping. The amount of interest researchers have shown in the subject has paralleled the general concern with this form of school organisation. This paper seeks to extend our knowledge of ability grouping through the reanalysis of two sets of survey data, the Plowden survey (Peaker, 1967) and the NFER streaming survey (Barker Lunn, 1970).* Two questions will be asked, the first concerned with the relationship between the pupil's social background and his stream position, the second with the impact of streaming on achievement. Both have been examined before, so it is appropriate to justify further exploration of these questions by looking at existing research. The review will be limited to recent British studies.

PREVIOUS RESEARCH

Critics of streaming have long held that stream assignment practices are unfair. For some this simply meant that a disproportionate number of pupils from working-class backgrounds would be placed in the lower stream, a fact which could be readily verified. For others it meant that the schools' stream placement decisions would be related to pupils' social background *after* differences in achievement had been taken into account. That is, two scholastically equal pupils coming from different homes would tend to be assigned to different streams.

Two researchers have looked at the question of stream assignment in this way. Douglas (1964) reported that:

> . . . middle-class children tend to be allocated to the upper streams and the manual working-class children to the lower ones (there are 11 per cent more middle-class children in the upper streams than would be expected from their measured ability at 8 years and 26 per cent fewer in the lower). (Douglas, 1964, p. 148.)

Douglas does not report the way in which ability was controlled in this instance. In a parallel analysis in which different background indices were used (one an index of 'maternal care' and the other of family size) it is clear that the ability variable was divided into four categories covering unequal ranges of the underlying distribution. It is questionable whether the partial relationship between social background and stream position would remain if the ability variable had been used in its entirety.

Ford's analysis is also based on a cross-tabulation in which IQ and social class are used as dimensions. She, too, reports a partial relationship between social class and stream position when ability is held constant:

46 per cent of the middle-class children in the grammar school with ' high '

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* The author would like to thank the people responsible for making these data sets available and at the same time emphasise that the conclusions reached in this paper are his own responsibility. Mrs. Joan Barker Lunn and Miss Jill Tarryer were primarily responsible for supplying the NFER streaming data and for providing helpful comments on drafts of this paper. The Plowden survey data were made available with the help of G. F. Peaker, Roma Morton-Williams and John Bynner.

> IQs are placed in the 'A' stream, while only 10 per cent of the working-class children in the same ability range achieve this placement . . . (Ford, 1969, p. 37.)

A similar result was obtained for pupils in a comprehensive school. However, the control for IQ was again coarse ; in this case a simple distinction was made between 'high' and 'low' IQ pupils. Possibly the use of cross-tabulation dictated the compression of the ability scale . To avoid empty cells it may have been necessary to use broad rather than narrow variable categories. The analysis reported below, which uses regression techniques in place of cross-tabulation, contrasts with both Douglas's and Ford's analysis by using the maximum amount of information about pupil performance. It will be seen that the outcome of the analysis is markedly different, a difference which may be attributable to contrasting techniques of analysis.

The greater part of research on streaming has been concerned with its impact on academic performance. Much of it has been carried out at a time of active debate about the replacement of traditional practices by mixed ability grouping. The researchers' focus has matched that of the educational and political debate by concentrating on the impact of streaming at the level of the school. Thus, there is a considerable amount of evidence about the consequence of attending a streamed or an unstreamed school. For example, small scale surveys by Daniels (1961b), Blandford (1958) and Rudd (1958), which produced mixed results about pupils' performance, used the school as the unit of analysis. The best large-scale British study (Barker Lunn, 1970), also compared school type. Using co-variance techniques Barker Lunn looked at the effect of streamed and unstreamed school organisation within categories defined by three pupil characteristics, social class, sex and initial achievement. The results indicated that a pupil of given social background, sex and tested achievement would be expected to perform at about the same level in either a streamed or unstreamed school.

The assumption which guides the reanalysis is that the investigation of streaming effects should be pitched at the level of the classroom rather than that of the school. The fact that no consistent school-level effects have been reported does not rule out the possibility of substantial within-school effects.

There are at least three reasons why pupils in the higher stream would be expected to increase their advantage over lower stream pupils. First, upper stream pupils have access to better physical resources and better teachers. Second, different curricula are commonly designed for upper and lower streams with the explicit intention that clever pupils may learn at a faster rate than less clever pupils. Third, popular wisdom asserts that teacher expectations have a powerful effect on pupils' performance, an effect which is compounded by the pupil's own perception of his ability. In grouping pupils according to their ability, some are defined as superior, others as inferior ; a definition which peers and teachers accept and reinforce. Since stream assignment is almost irrevocable (Daniels, 1961a) the cumulative psychological effect handicaps the lower stream pupil and gives a further advantage to the upper stream group.

If anything, the available British evidence supported the expectation of finding class level effects. Douglas's findings showed that upper stream pupils in junior schools gained an average of 0·71 test points between the ages of 8 and 11 while pupils in the lower stream lose an average of 0·49 points (Douglas, 1964). When Douglas followed the same cohort into secondary school the continued divergence was found for some groups, but not for others (Douglas and Ross, 1968). Jackson's conclusion is similar to Douglas's earlier finding in that the average test scores of upper and lower stream pupils were found to diverge over time (Jackson, 1964).

Evidence which bears indirectly on the same point has been reported by Daniels (1961b) and Barker Lunn (1970) who have shown that the dispersion of scores in streamed schools is greater than that in unstreamed schools. This finding has been interpreted as showing that streaming causes an increase in pupil differentiation within the school. For example, Barker Lunn concluded:

> Approximately 18 per cent of the comparisons (between streamed and unstreamed schools) indicated that the spread of scores was greater, reaching at least the 5 per cent level of statistical significance, in streamed schools while the spread in non-streamed schools was never significantly larger. This suggests that ***non-streaming tends to reduce the dispersion of test scores and streaming to increase it.*** (Barker Lunn, 1970, p. 67, emphasis added. See also footnote *.)

Unfortunately, none of these authors presents their findings in a way which allows one to inspect the trend in test score dispersion satisfactorily. Daniels's results are not reported in a way which facilitates examination of trends for the four schools which his observations are based on. As the quotation above suggests, Barker Lunn reports her findings in terms of the number of comparisons between the two school types in which the test score variance for streamed schools was greater than that of unstreamed schools. Since the actual size of the test score variance is not reported, it is only possible to make an indirect observation of the changes in test score dispersion. What appears to be the case (Tables 5. 7, Appendix 6, Barker Lunn, 1970) is that the larger dispersion of scores in streamed schools exists at the time of the initial testing and shows no signs of becoming larger over the four years covered by the follow-up surveys. If this is the case, it would be incautious to conclude that streaming increases the amount of differentiation among pupils.

THE ANALYSIS

The purpose of the analyses will be to offer alternative techniques for answering the questions about the determinants of stream placement and the impact of stream assignment on achievement.

(1) *Stream assignment.*

The first problem, concerning the residual relationship between social background and stream position, will be investigated with the Plowden survey data. In 1964, information was collected on a national sample of primary school pupils. The analysis is based on those pupils who were reported by their teachers to be in streamed classes. Regression analysis was used as the most economical method of treating the data. For each of three subgroups pupils' stream position was regressed on two measures of academic performance, i.e., an achievement score and the head teacher's rating of the pupils' performance, and on five measures of the pupils' social background. The details of these regression analyses are reported in Table 1. Together, the independent variables account for rather more than half the variance in stream position. However, in all three subgroups the contribution of the teacher assessment variable far outweighs those of the social background variables. Only in one instance does a measure of social background emerge with a significant standardised partial coefficient in the equations. Another way of demonstrating the small contribution of the background variables is to compute the unique variance that can be accounted for by these measures. In none of the three subgroups can more than 2 per cent of the variance in stream position be attributed to social background variables.

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*Barker Lunn has pointed out that this finding is inconsistent with some other results obtained in the original analysis of the data:

" (The findings) should be treated cautiously, since one cannot state exactly what the greater score spread in streamed schools means. One might suppose that the greater spread implied that the brightest of the bright (i.e., the top third) did better and the dullest of the dull (i.e., the bottom third) did worse in a streamed school. But there is no evidence that this was so. It will be remembered that children in the two schools were matched for ability at 7+ (i.e., were allocated to one of three ability groups) and it was found that children of comparable ability made similar progress during their junior course in the two types of schools. If the bright or some of the brightest had made substantially greater academic progress in streamed schools and the number had been of any consequence, then this would have affected or ' pulled up ' the average gain, but this did not occur " (p. 67, Barker, Lunn, 1970).

TABLE 1

ANALYSIS OF THE DETERMINANTS OF STREAM POSITION. (PLOWDEN SURVEY).

Independent Variables	Age of Sub-Group		
	7–8	8	11
Pupil achievement	**0·117**	**0·183**	**0·089**
Teacher rating of pupil ability	**0·627**	**0·603**	**0·716**
Father's occupation	0·074	**0·103**	–0·026
Father's income	–0·016	–0·028	0·056
Father's age on leaving school	0·064	0·048	0·029
Mother's age on leaving school	0·012	–0·024	–0·005
If relatives went to selective secondary school	–0·057	–0·042	0·039
Multiple correlation	0·729	0·771	0·812
N	496	357	619

Standardised partial regression coefficients are reported for the independent variables (left-hand margin) and these are in bold if more than twice their standard errors (The 8-year-old group is also included in the 7- to 8-year group.)

It is true that the independent variables leave much of the variance in stream position unexplained. Therefore, it is possible that assignment decisions are influenced by factors which have not been included in the equations. Even so, the analysis indicates that these unidentified factors would not be closely related to the traditional indices of social status. The conclusion, which clearly opposes that of Douglas and of Ford, is that the pupil's stream position is not biased in favour of pupils with more favourable home backgrounds. However, there is a rough agreement between this finding and that of Floud, Halsey and Martin (1956) who showed that success in entry to grammar school " can be explained almost entirely in terms of the unequal distribution of measured intelligence," social background factors playing little part.

(2) *The effects of streaming.*

The second part of the analysis, dealing with the impact of stream position on pupil performance, is based on the NFER streaming survey sample. Schools with more than three classes or schools in which the number of classes had changed between the first and last surveys were excluded from the analysis.

Otherwise the sample used here is the same as that on which Barker Lunn's longitudinal analysis was based. Part of this sample, which entered junior school in 1964, was followed up in the three following years. On each occasion achievement tests were administered to the pupils. The sample was divided between pupils attending two types of school: streamed and unstreamed. This made it possible to examine the trend in the dispersion of test scores for pupils in the two school types. First it was established that between-school test variance did not change in a systematic way over the three-year period. This meant that such changes as were taking place in the dispersion of scores within schools would not be obscured by between-school effects. The next step was to examine the trend in individual pupil test score dispersion (Table 2). The sample is divided into two groups, A and B, which took parallel forms of the same achievement tests.

TABLE 2

STANDARD DEVIATIONS OF PUPILS' TEST SCORES IN STREAMED AND UNSTREAMED SCHOOLS, BY YEAR AND BY SUBGROUP (NFER SURVEY).

Reading performance						
Type of School	Subgroup	1964	1965	1966	1967	N
Streamed	A	14·57	14·58	15·13	14·52	1233
Unstreamed	A	13·68	13·79	13·70	14·50	1161
Streamed	B	14·01	14·85	13·49	14·75	1303
Unstreamed	B	13·70	13·29	13·43	14·26	1305
Problem arithmetic skill						
Type of School	Subgroup	1964	1965	1966	1967	N
Streamed	A	15·18	15·96	15·61	15·36	1188
Unstreamed	A	13·87	13·05	14·04	13·90	1169
Streamed	B	14·48	15·39	14·56	14·28	1306
Unstreamed	B	12·81	12·80	12·86	13·00	1287

First, the expectation was confirmed that the dispersion of scores in the streamed schools was consistently greater than in unstreamed schools. For some reason, which cannot be investigated with these data, this difference is found at the time of the first survey, when pupils were in their first year of junior school. The second and more important question is whether there is any tendency for the dispersion of pupils' scores in streamed schools to change in a way which is different from that of pupils in unstreamed schools. Fluctuations are found from year to year in both types of school. However, over the three-year period there is no consistent trend for either school type. In fact, the dispersion of scores appears to be constant for all practical purposes. On the basis of this evidence it can only be concluded that neither type of school organisation is associated with changes in the variation of pupil achievement. The conclusion ,which is at odds with previous research, is that streaming does not act in a way which enlarges the differences among pupils.

The total variation of test scores among pupils reported in Table 2 is made up of differences that exist at the three levels, that of the school, the class and the pupil. The first source of difference has already been judged unimportant for the purposes of these analyses which are designed to investigate within-school effects. The second and third of these sources together make up the within-school variation of test scores. So far they have not been differentiated. The results reported in Table 2 indicate that the dispersion of scores among pupils is static in both streamed and unstreamed schools. This result might conceal the fact that changes are taking place in the variation of scores at the level of the class and pupil. For example, it might be that within-stream variation is decreasing over time, while between-stream variation increases, the two components offsetting one another. Alternatively, the opposite might happen when an increase in within-stream variation is counterbalanced by a decrease in between-stream variation.

TABLE 3

Class Average Test Scores in Upper and Lower Streams of Streamed Schools, By Year and By Sample (NFER Survey).

Sample Type	Number and Type of Streams					
A	2 Upper	114·75	110·17	115·13	117·39	122
	Lower	93·69	91·35	93·85	100·12	117
	Difference ..	21·06	18·82	21·28	17·27	
B	2 Upper	106·45	109·46	112·76	107·80	237
	Lower	91·42	90·96	95·92	91·70	192
	Difference	15·03	18·50	16·84	16·10	
A	3 Upper	114·49	109·63	115·84	117·40	161
	Lower ...	88·55	87·81	89·59	93·69	109
	Difference	25·94	21·82	26·25	23·71	
B	3 Upper	113·82	113·96	118·98	113·67	157
	Lower	87·71	89·59	95·57	91·00	101
	Difference	26·11	24·37	23·41	22·67	

The most straightforward way of examining changes in between-and within-stream variation is to calculate the average score for pupils in the upper and lower streams at the four points in time. In Table 3 these values are reported for a composite achievement score computed by averaging each pupil's score on four separate tests, two in English and two in mathematics. The results indicate that the gap between the upper and lower streams does not change substantially over time. A comparison between 1964 and 1967 would support the view that the gap narrows.* However, a close inspection of the results indicates a complex picture of small increases and decreases from year to year. Depending on which two years are chosen for comparison, it is possible to find slight changes in either direction. Thus no consistent pattern can be reported. Once more, the conclusion opposes that of Douglas who demonstrated a divergence of stream mean scores on the basis of observations at two points in time. It is possible that had his sample been followed up on three or four occasions the same unsystematic convergence and divergence of stream mean scores would have been found. It will be recalled that the analysis of the second follow-up survey (Douglas and Ross, 1968) showed that the gain for high stream pupils was not sustained in all cases.

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* It has been pointed out to the authors by the researchers responsible for the original analysis that the mean standardised scores may be expected to increase over time. The same test instruments were used each year of the study so that the raw score disctributions, which were positively skewed at 8+, gradually grow symmetrical and finally become negatively skewed at age 11+. This behaviour is reflected in the means of the standardised distributions, which were formed by equating successive areas under the curve, thus ensuring that the expected median would be 100 for each test at the central age of the children on each occasion of testing. This means a gradual increase in the mean. It has also been suggested that the test construction might account for the observed tendency to narrowing of the difference between stream mean scores. The raw scores can be expected to discriminate rather better for the 9+ and the 10+ groups, and it is not easy to tell whether this effect is sufficient to account for the narrowing of the perceived gap at the upper age of testing.

The results indicate that the between-stream variance would be quite stable over time. Going back to the two alternatives set out above, this means that the stability of test score dispersions reported in Table 2 reflects a situation in which the between-stream variation is also stable, and so too the variation within streams. All this reinforces the view that the impact of stream position is quite small.

A direct assessment of the impact of stream position will be derived from a regression analysis. The independent variable is the 1967 achievement score which is regressed on achievement score and stream position in 1964. The intention is to quantify the effect associated with the stream position variable and so to estimate the effect of differential stream assignment. Of course, these data are non-experimental so the estimate cannot be regarded as a direct expression of the effect of assigning a pupil to a stream other than the one he is in fact placed in.

TABLE 4

ANALYSIS OF THE DETERMINANTS OF PUPILS' 1967 ACHIEVEMENT SCORES (NFER SURVEY).

	Subgroup and number of streams			
(1) Dependent variable: Reading achievement score	A2	B2	A3	B3
1964 Reading achievement (β)	**0·57**	**0·65**	**0·73**	**0·62**
1964 stream position (β)	**0·29**	**0·18**	**0·14**	**0·19**
1964 stream position (b) uncorrected	8·07	5·15	2·62	3·63
1964 stream position (b) corrected	7·12	3·64	0·93	2·60
Multiple correlation (R)	0·79	0·78	0·83	0·77
(2) Dependent variable: Problem Arithmetic score				
1964 Problem Arithmetic score (β)	**0·70**	**0·50**	**0·71**	**0·55**
1964 stream position (β)	**0·14**	**0·35**	**0·16**	**0·29**
1964 stream position (b) uncorrected	4·06	10·25	3·31	5·36
1964 stream position (b) corrected	0·31	9·52	0·04	4·40
Multiple correlation (R)	0·81	0·76	0·82	0·77
N	208	377	342	374

Standardised partial regression coefficients (β) are reported for both the independent variables. In addition, raw regression coefficients (b), both uncorrected and corrected for the reliability of the variables, are reported for the stream position variables only. (Coefficients are in bold if they are more than twice their standard errors.)

Table 4 reports the standardised regression coefficients for the two independent variables. The most interesting feature of the results is the size of the coefficient for the stream position variable. With one exception, this coefficient is found to be positive and significant. This means that after allowing for initial differences in achievement there is an advantage associated with placement in the upper stream. This advantage may be measured in terms of test score points by reference to the third line of each subsection of the table which reports the raw regression coefficient for the stream position variable. A difference of one stream level is associated with a difference of between 2 and 10 test points over the three-year period.

This effect may be attributed in part to measurement error. It has been shown that pupils are assigned to streams to a large extent on the basis of their academic performance. It is reasonable to expect that the school's estimate of a pupil's performance is at least as accurate as the 1964 measure of achievement used in these analyses. If a pupil in a high stream scored badly on the 1964 test, it is likely that his true ability was underestimated because pupils in the upper stream are, on average, superior to those in lower streams. Conversely, if the pupil is in the lower stream, but scores well on the 1964 test, his true ability is probably overestimated.

The 1967 achievement variable is not perfectly associated with the 1964 variable. Thus, if a pupil's achievement level is initially overestimated he would be likely to show a 'loss' on the 1967 achievement score, and conversely if his initial score is underestimated he would be likely to show a 'gain.' Assuming that pupils' achievement levels in the upper stream tend to be underestimated in 1964 while the achievement level of pupils in the lower stream tends to be overestimated, what appears to be a streaming effect may in reality be a reflection of measurement error.

Since the reliabilities of the reading and arithmetic tests were known, the correlations on which the analyses were based could be corrected for unreliability. The corrected coefficients were then used to re-estimate the stream position effects which are reported in terms of the raw regression coefficients on the fourth lines of the subsections of Table 4. As expected, these values are somewhat smaller than the uncorrected estimates, ranging between 0 and 9 points. However, the reduction is not sufficient to eliminate the stream position effect.

DISCUSSION

Two main findings have been reported in this paper. The first is that stream assignment decisions in the junior school do not appear to be influenced by social background differences once differences in pupil achievement have been taken into account. The second finding is that the effect of differential stream position is small, but not trivial. Taken together, these findings imply that streaming is not the means by which schools either create or enlarge differences which exist among pupils at the time when they enter junior school. Of course, practices in the infant school may have created these initial differences but this possibility cannot be explored with these data.

Ignoring all the practical and political problems that would be involved in abolishing streaming, it is predicted that the replacement of this form of school organisation would have some impact on the distribution of achievement among pupils. However, the size of that impact would not be great, and, to enter a judgment at this point, it is not big enough to justify the replacement or retention of streaming in terms of its effect on academic performance. This conclusion is much the same as Barker Lunn's: "If one is to judge the streaming—non-streaming issue solely on the basis of academic performance, the findings of this chapter lend small support to either side" (Barker Lunn, 1970, p. 70).

It should be remembered that one of the clearly articulated purposes of ability grouping is to change the rate at which pupils learn. The reanalysis of the NFER data, along with the original analyses, suggests that ability grouping does not do this to any great extent. One reaction to this evidence might be to reconsider the criteria and outcomes which have traditionally been used to justify ability grouping. For example, proponents of groupings have pointed to the fact that teachers find it easier to manage homogeneous classes. Opponents have justified non-streaming in terms of its effect on pupils' self-image. This implies that the 'real' function of streaming is revealed only when the supposed functions are seen not to be fulfilled. Such a process of retreat may have the virtue of stimulating reappraisal of the purposes of different forms of ability grouping.

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COMMENTS BY DR. J. BARKER LUNN

(1) *Concerning the dispersion of scores in streamed schools.*

In terms of the data in Table 2, Acland implies that I make a definitive claim that streaming increases the amount of differentiation among pupils (pages 153 and 155). On the contrary, I emphasise the need for a cautious interpretation of the results contained in Table 2 (see his footnote, page 153) and point out that these findings are inconsistent with those obtained longitudinally.

(2) *On the average test scores* (*Table* 3).

The NFER's statisticians have made some comments on this which appear in footnote 2 on page 000 of Acland's article. They suggest that the raw score distributions can also be expected to discriminate rather better for the 9+ and 10+ age groups, and it is not easy to tell whether this effect is sufficient to account for the narrowing of the perceived gap at the upper age of testing. Such an effect, they suggest, would explain the different behaviour reported by Douglas whose test battery included two common tests at 8+ and 11+ in combination with two tests which were specifically introduced for the age group under test.

It is a pity that Acland does not tell us more about his data here. Having carried out a within-school analysis and presumably having obtained a distribution of school standard deviations and stream means, one would like some information ; also one would like to be informed about school differences. One would expect the academic performance of different streams in some schools to become increasingly divergent over time. The question that might be asked is : in how many and in what type of school do the statistics change with time in the different streams ?

More illuminating than the relatively insensitive mean score would be an examination of change over time in the proportion of children in each stream scoring above the population percentile. By using the overall mean score for each stream, one lumps together the results obtained from very dissimilar schools—for example the mean score of the A stream in a middle class area is very different from that in a working class area—consequently much information is lost.

(3) *On the regression analysis.*

Acland interprets the regression analysis in an apparently fallacious and misleading way. Namely, he fails to recognise that two significantly correlated variables are unlikely both to have high regression coefficients (This argument also applies to his reanalysis of the Plowden Survey data—pages 153-4.)

On page 157 he states that : "A direct assessment of the impact of stream position will be derived from a regression analysis. The independent variable is the 1967 achievement score which is regressed on achievement score and stream position in 1964. The intention is to quantify the effect associated with the stream position variable and to estimate the effect of differential stream assignment."

In suggesting that regression analysis will give an answer here, Acland has failed to recognise that the two predictors are significantly correlated. By the very naturd of regression analysis this means that the amount of variance accounted for by the first variable selected will automatically reduce that accounted for by the second. In other words, the variance contributed by achievement in 1964 would to a certain extent represent variance ' borrowed ' from stream position, thus reducing the apparent contribution of stream position.

It would have been helpful if Acland had provided the correlation coefficients between the predictors and criterion, and also between the predictors themselves, which would have indicated more clearly the pattern of relationships between the variables.

(4) Although Acland reanalysed my data from two additional standpoints the conclusions he reached are essentially the same.

FEEDBACK PROCEDURES IN COMPUTER-ASSISTED ARITHMETIC INSTRUCTION

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SUMMARY. A computer-assisted instruction (CAI) system can provide detailed and immediate feedback following every student response. Two such procedures, labelled 'active' and 'passive' were designed for helping children to multiply two- and three-digit numbers by one-digit numbers. The active feedback procedure required an overt response to be given to each element in the procedure for computing the answer. The 'passive' procedure merely printed a feedback message. Two experiments are described which had treatment conditions of (i) no feedback, (ii) passive, and (iii) active feedback. As well as on-line performances being recorded in detail by the computer, pre-and post-tests were given. Substantial gains on pre-and post-tests were recorded for the feedback groups, and a regression analysis showed that greatest effects were with pupils whose initial level of achievement was low. Overall differences between the two feedback groups did not reach significance. Finally, a simple model to account for multiplication performance is proposed.

INTRODUCTION

IT is impossible for a classroom teacher consistently to provide immediate feedback. When, for instance, 25 children are completing an arithmetic exercise in class, about the best a teacher can do is here and there to tell a student he is right or wrong. If the teacher chooses to give detailed attention to one pupil, explaining step by step the procedure for solving a problem, the rest of the pupils are meanwhile left to practise on their own without any feedback. Immediate feedback is probably the exception rather than the rule in classroom instruction.

A computer-assisted instruction (CAI) system can provide detailed, immediate feedback following every student response. This is a theoretical advantage, but whether it is a real one remains to be seen. To be sure, one of the best documented propositions in psychologyis that feedback facilitates learning (cf. Annett, 1969). But experimental demonstrations of the value of immediate feedback using actual lessons have been rare.

Because immediate feedback is one of the hallmarks of programmed instruction and the principal basis for the claim that programmed instruction represented the beginnings of a " technology of instruction based on the science of learning " (Skinner, 1954), the weak effects of feedback in programmed lessons are especially ironic. Not a single one of the 13 programmed instruction studies reviewed by Grundin (1969) showed a significant increase in learning due to feedback. Lublin (1965) actually found that students learned significantly more from a programmed introduction to psychology when they never received feedback.

Why has the previous research with lessons, programmed lessons in particular, generally failed to show an advantage from immediate feedback ? A first answer has been provided by Anderson, Kulhavy and Andre (1971, 1972), who have argued that feedback sometimes permits 'short circuiting' of instruction. Workbooks and programmed texts often allow the student access to the correct answer before he composes his own response. If he sees the feedback before he responds he may not study the explanation, may not formulate an answer to the question, may not try to solve the problem; he may simply copy the answer. Anderson, Kulhavy and Andre employed a CAI system so that, unlike many of the previous studies, it was possible to ensure that feedback was unavailable until after the student responded. In two experiments involving instruction in the diagnosis of heart disease from electrocardiagrams, and one experiment involving instruction in population genetics, students who received feedback after every response learned more than students who never received feedback. Especially interesting was the performance of students for whom feedback was available *before* responding; they learned significantly less than those who got feedback *after* responding, indeed, even slightly less than those who never got feedback. The conclusion is that feedback facilitates learning only if contingent upon complete responses.

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A second reason for the failure of previous instructional research to show benefits from feedback was a misconception of the function of feedback. Educators have assumed following Skinner that feedback serves as reinforcement, that is, that it 'strengthens' correct responses or makes them more probable. It is now pretty certain that information provided to a human being about the adequacy of his responses is chiefly important to help him correct his mistakes rather than as reinforcement. Guthrie (1971) has given a persuasive demonstration of this. After each sentence in a passage from an encyclopaedia chapter on magnetism had been read, Guthrie presented students with a completion question. On post-test questions answered correctly during learning, students who had received feedback did no better than students who had not. Thus, there was no evidence that feedback strengthened tendencies to give correct answers. However, feedback greatly improved post-test performance on questions initially answered incorrectly.

If the main function of feedback is to provide the learner with the opportunity to correct errors, then it is obvious that feedback will have little effect when few errors are made. Feedback will be important when the task is difficult or the student is a beginner, less important when the task is easy or the student is nearing mastery. Herein lie further grounds for discounting the equivocal research on feedback in programmed instruction: the error rate in most self-instructional programs is kept so low that there is little chance for the beneficial effects of feedback to appear.

The purpose of the research described in this paper was to develop and validate computer-controlled feedback procedures to help children learn to multiply two- and three-digit numbers by one-digit numbers. These procedures are to comprise one component of an adaptive instructional system for teaching junior school mathematics. Part of the instruction will be accomplished by human teachers, part by CAI system. In the case of multiplication, the teacher is to introduce the algorithm; the CAI system is to provide practice and remediation until a criterion of mastery is reached.

A two-stage technique for providing feedback on the CAI system was evolved. When a child correctly typed a digit, the digit was printed and the machine advanced in preparation for printing the next digit. However, when the child incorrectly typed a digit, the digit did not print nor did the machine advance. Instead a bell rang. The bell warned the child he had made a mistake. He was given another chance to type the digit. If he made a second error, the bell rang, the digit was again not printed but this time a feedback message appeared to the right of the problem. The message indicated the product of the two digits being multiplied plus the carry value. Below is an illustration of the message which would appear if a child made two errors in the tens position in this problem :

$$\begin{array}{r} 764 \\ \times\ 9 \\ \hline 6 \end{array} \qquad 6\times 9+\text{Carry } 3=57 \quad \text{Put down 7 Carry 5}$$

The child then got a third chance to type the digit and, if he did so correctly, he attempted to complete the rest of the problem. If he made a third error on the same digit or a double error on any subsequent digit, the problem was terminated and the child went on to a new problem. Following problems completed without error, the computer printed *Good*. When a child finally got a problem right after making one or more errors, including self-correcting or ' one bell ' errors, the computer printed *Now it's right*.

We had every reason to believe on the basis of previous research and theorising that the feedback procedures described thus far would help children learn to multiply. Pilot data raised doubts, however. The children were not showing much improvement even from lengthy periods of practice. Observing the children closely, we noticed that the next response usually followed the feedback message with alarming speed. Some children looked away while the computer typed the feedback message and then appeared to look only at the final answer at the end of the message. The proper inference seemed to be that the children were copying the answer from the feedback without attempting to understand why this was the answer or the procedure for producing the answer.

Next we designed a procedure which we hoped would require the pupil's active engagement with the feedback. As before, the pupil was allowed a second chance whenever he made a mistake. If still in error, the problem was interrupted and a series of six questions were asked. Below are the questions and the feedback provided when the questions were answered incorrectly. Assume, as before, that the child made a mistake on the second digit of the answer to 764×9.

What should you have carried ?	No, it should have been 3.
What number ×9 now ?	No, it is 6.
What is 6×9 ?	No, 6×9=54.
Now, add on the carry.	No, 54+3=57.
What do you put down ?	No, put down 7.
What do you carry now ?	No, carry 5.

This ' active feedback ' procedure required an overt response to each element in the procedure for computing the answer. Thus, unlike the original procedure—now called ' passive feedback ' by way of contrast—short-circuiting of the instruction seemed improbable. Moreover, active feedback contained more information than passive feedback. The research generally shows that the more information provided the greater is the facilitation from feedback (e.g., Gilman, 1969). As with passive feedback, under active feedback the computer printed *Good* when a problem was completed without error and *Now it's right* when a problem was corrected following an error.

EXPERIMENT 1

Method.

Subjects and design. The subjects were 58 children enrolled in a second-year class and a third-year class at a junior school in a working class area of a large industrial city. The subjects were randomly assigned to the four conditions of the experiment, which were : tests only, no feedback, passive feedback or active feedback. The tests-only condition served as a control for the priming effect of the pre-test, maturation, and other correlative factors. The intention was to make three orthogonal comparisons among the conditions after covariance adjustment to eliminate differences in ability to multiply which appeared on the pre-test. The first would compare the tests-only condition with the other three conditions to answer the question, " Did children learn from CAI practice in multiplication ? " Second, the no feedback condition was to be compared with the passive and active groups to answer the question, " Did feedback facilitate learning ? " Finally, the active and passive conditions were to be compared to determine, " Was active feedback more beneficial than passive ? " An affirmative answer to each question was expected.

Procedure. Under every condition the children first took the pre-test then—with the exception of the tests-only group which engaged in regular school activities—received six computer-controlled practice sessions, and finally, completed the post-test.

The criterion measure consisted of 20 multiplication problems generated at random with the constraints (1), that in half the problems the number being multiplied was two digits in length and that in half it was three digits in length, and (2), that in half the problems the multiplier was a digit from 2 to 5, while in the other half a digit from 6 to 9. The same paper-and-pencil form of the criterion measure was used as the pre-test and the post-test. Each child received the pre-test about 20 hours before his first practice session and received the post-test about two hours after his last session.

The experiment was run in five shifts of about a dozen children. Roughly equal numbers of children within each shift received each of the four conditions. Those who received on-line practice were taken by minibus to the computer installation on two consecutive days. On each day the children got three 15-minutes practice sessions interspersed with 15-minute periods of rest. At the end of the experiment the children in the tests-only group were also brought to the installation to make good our promise that eventually every pupil would get a turn.

The CAI system consisted of a Modular One computer with 16,000 words of core store and a disc file interfaced with nine teletype terminals, five of which were employed in this experiment. Of course, the system was programmed to allow individualised treatment of each child.

All of the children had had previous experience with computer-assisted arithmetic instruction. Prior to the experiment they were given a further briefing in which the condition that each group was to receive was explained and illustrated. A child's computer-assisted practice consisted of a series of multiplication problems to solve. In each of the six sessions the problems were generated at random under the same constraints that applied to the criterion measure. Since an on-line random number generator was employed, each child received an independent random sample of problems. Children worked at their own rates. This meant that there was considerable variation in the number of problems completed.

The computer typed the problems in the traditional vertical format. The child typed his answer in the right to left order, as he would if he were solving the problem on paper with a pencil. The active and passive feedback procedures have been described already. Under the no feedback condition the pupil performed without any signal that he was right or wrong, much as he would if he were completing a multiplication exercise in class. At the end of each practice session, under all conditions the computer printed the number of problems correct and incorrect.

Results and Discussion.

The results of the first experiment can be summarised very simply. The differences among conditions in adjusted post-test performance were negligible, and under none of the conditions was there much improvement from pre-test to post-test. The active feedback group did slightly better than the passive feedback group which in turn did slightly better than the no feedback group, but none of the planned comparisons even approached significance.

Following the maxim that one should not discard a good hypothesis because of a little bad data, we persisted in the belief that feedback would enhance learning. The failure to get benefits from feedback was still attributed to short circuiting of the instruction, a problem which the active feedback procedure was supposed to solve. But even with active feedback it appeared that children were able to copy answers without understanding the procedure which produced the answers. Evidence from this came from the analysis of the answers to the questions entailed in active feedback. Often, for instance, pupils who incorrectly answered the first question on what should have been carried would persist in using this incorrect carry value, even though given the correct one, when later told *Now, add on the carry.*

To get pupils to pay attention to and use the information in the feedback messages, we next tried requiring them to repeat the question until it had been answered correctly. For example, if the child typed 53 when asked *What is* 6×9?, the computer would reply *No,* $6 \times 9 = 54$, and then again ask *What is* 6×9? The question would be repeated until the child finally typed 54. This procedure ensured that the child would pay attention to the feedback. He could not proceed until he did.

To increase the probability that pupils not only attended to but actually used the information in the feedback, a cardboard screen was fitted on each teletype. After feedback, the feedback message rolled up behind the screen so that it could no longer be seen. Then the problem upon which the error had been made was presented again. The new arrangement made it impossible for the child to copy the answer; he had to have the answer or the method for generating the answer in his head.

The technique of removing the feedback from view and requiring the pupil to repeat problems upon which errors were made was also used in conjunction with passive feedback. It should be emphasised that under both active and passive feedback the child now had to get the problem he was working on right before he was allowed to go on to a new problem.

The second experiment compared the revised active and passive feedback procedures with no feedback. Once again it was expected that feedback would be better than no feedback, and that of the two feedback procedures active would prove superior.

EXPERIMENT 2

Method.

Subjects and design. The subjects were 52 of the children who had participated in the first experiment. They were re-assigned to no feedback, passive feedback or active feedback conditions using a stratified random sampling procedure. The children were divided into groups of three matched on the basis of pre-test scores from the previous experiment. From within each group one child was assigned at random to each condition.

Procedure. Under every condition, the pupils took two pre-tests, received 12 computer-controlled practice sessions, and then took two post-tests.

The criterion measure consisted of 24 multiplication problems. In half of the problems the number being multiplied was a randomly-generated two-digit number, in the other half a randomly-generated three-digit number. The multiplier was a randomly-selected one-digit number between two and nine. The same paper-and-pencil form of the criterion measure was used as a pre-test and a post-test.

The second and subsidiary measure required writing the products of all possible pairs of one-digit numbers. For convenience this will be called the test on the ' tables,' though we do not wish to imply that the children had literally learned tables. The pairs of numbers were presented in a random order to groups of children by means of an overhead projector. Each pair was exposed for 10 seconds. The test was paced because a high level of skill at multiplication probably requires immediate access to the product of any pair of digits. If a child has to compute a product or try to bring it to mind by rehearsing the tables, very likely the carry value from the preceding operation will drop out of short-term memory; the smooth synchronised flow of performance which is the essence of mastery-level skill will be disrupted. There was a tables pre-test and a tables post-test.

The experiment was run in six shifts of from eight to 10 children. Approximately equal numbers of children from within each shift received each of the three conditions. The children received three 15-minute practice sessions on each of four consecutive days. The practice sessions alternated with 15-minute rest periods.

The multiplication problems to be solved during the 12 practice sessions were arranged from easy to difficult. As in the previous experiment the number being multiplied was a randomly-generated two- or three-digit number. However, in this experiment the one-digit multiplier was constrained according to the following schedule:

Session	*Multiplier*
1–4	All 2–5
5–8	Half 2–5, Half 6–7
9–12	Half 2–7, Half 8–9

Within these constraints the multipliers were selected and sequenced at random for each child on each problem, independent of other children and other problems.

As already indicated, the feedback procedures were modified so that the pupil was required to get each problem correct before he went on to new problems. Under passive feedback, the child was counted as meeting this criterion provided he made no errors on a problem following feedback. If he made a third error on the same digit or a double error on a subsequent digit, the problem was repeated. Under active feedback the feedback necessarily interrupted the problem, so the whole problem was always repeated after feedback. There was one other modification of the active feedback procedure. The second question, ***Which number x n now*** ? was eliminated because it seemed to confuse the children more than it helped them.

Results.

Table 1 summarises the principal data of the experiment. The covariance adjustment of the criterion post-test removed variation present on the criterion pre-test. Similarly the tables post-test was adjusted on the basis of the tables pre-test.

TABLE 1

PROPORTIONS CORRECT ON PRE-TESTS AND POST-TESTS.

Feedback	Criterion Test			Tables Test		
	Pre	Post	Adjusted Post	Pre	Post	Adjusted Post
None	·28	·38	·43	·62	·75	·78
Passive	·38	·62	·59	·68	·80	·79
Active	·37	·61	·59	·71	·85	·83

The planned comparison between the feedback groups and the no feedback group on adjusted mean criterion post-test score proved significant, $t = 2{\cdot}74$, df=49, $P < {\cdot}01$. However, the second hypothesis, that active feedback would be more beneficial than passive feedback, obviously was not confirmed.

The linear regression of criterion post-test performance on criterion pre-test performance was plotted for the three feedback conditions. The slopes of the lines for the feedback and no feedback conditions were significantly different, $t=2{\cdot}23$, df=46, $P < {\cdot}05$. As expected, feedback had its greatest effect on pupils whose initial level of achievement was low.

There were no significant differences among conditions in adjusted mean tables post-test performance. When the regression of tables post-test performance on tables pre-test performance was plotted, the slopes for the active and passive conditions were significantly different, $t=2{\cdot}26$, df=31, $P < {\cdot}05$. Pupils who had a low score on the tables pre-test, and who had worked in the active feedback condition, performed much better on the tables post-test than similar pupils from the passive feedback group.

Table 2 summarises various aspects of performance during the computer-controlled practice sessions. Table 3 contains the analysis of performance on the five types of questions asked during active feedback.

TABLE 2

PERFORMANCE DURING PRACTICE SESSIONS.

Measure	Feedback Condition		
	None	Passive	Active
Mean number of problems attempted*	230	209	143
Mean number correct on first try	91	126	113
Mean number of errors corrected after warning bell	—	40	26
Mean number of repeated errors	—	61	33
Mean proportion correct on first try	·41	·58	·67
Mean proportion of errors corrected after warning bell	—	·49	·54

* Does not include problems repeated after feedback.

TABLE 3

ANSWERS TO ACTIVE FEEDBACK QUESTIONS.

Question	Mean Proportion Correct
What should you have carried?	·64
What is $n \times m$?	·53
Now, add on the carry	·71
What do you put down?	·83
What do you carry now?	·93

DISCUSSION

The main purpose of the present research was to develop and validate effective computer-controlled feedback procedures. This objective was reached in Experiment 2. The children who received feedback learned substantially more than those who did not. However, the experiment was not designed in such a way as to permit a discriminating answer to the question of why it succeeded where Experiment 1 had failed. The procedures of the two experiments differed in several respects. The practice problems were selected and sequenced at random in Experiment 1; they were ordered from easy to difficult in Experiment 2. Twice as much practice was given in Experiment 2 as in Experiment 1. Finally, in Experiment 2 each problem had to be correctly solved before the child went to the next problem.

While any of these factors or, indeed, extra-experimental factors could have made the difference, we are inclined to believe that one cause was improved control over attention to the feedback in Experiment 2. Auxiliary data were consistent with this belief. The children who received active feedback in Experiment 1 had a distressing tendency to continue to use a carry value product they had been told was incorrect, when asked *Now add on the carry*. This tendency had all but vanished in Experiment 2. Only 2·5 per cent of the answers involved a carry value or product the child had been told was incorrect. It is reasonable to suppose that the child now used the correct values because the questions *What should you have carried*? and *What is* $n \times m$? were repeated until the child answered them correctly. Thus, he had to pay attention to the correct values, and the likelihood that he would subsequently use them increased.

The hypothesis that feedback would have its greatest impact on the least advanced pupils was strongly confirmed. This conclusion must follow given that feedback helps the student to correct his errors. The frequency of errors and therefore of feedback, is by definition a decreasing function of level of competence. Not counting warning bells, there were nine children who received feedback fewer than 10 times during the 12 15-minute practice sessions. Feedback could hardly have had a dramatic influence on their performance.

Active feedback was expected to be more facilitative than passive feedback. While there was no difference between conditions on the criterion measure, a modest case for active feedback can be made on the basis of subsidiary measures. Firstly, the active feedback group got a higher proportion of problems correct on the first try during the practice sessions than did the passive feedback group (see Table 2). A test of significance was not appropriate since the conditions of performance during practice sessions were not strictly comparable. Nonetheless, the trend is worth noting. Secondly, children who initially did poorly on the tables improved more when they got active feedback than when they got passive feedback.

Consider finally a simple model to account for multiplication performance. For a child who knows the multiplication algorithm, his competence at the tables should place an upper limit on his multiplication performance. Present a child who knows 80 per cent of his tables with a randomly composed three-digit number to be multiplied by a randomly selected one-digit number, and his chances of solving it correctly are no better than $\cdot 8 \times \cdot 8 \times \cdot 8$. This conclusion follows from the product rule for the joint occurrence of independent events. Since he knows 80 per cent of the tables, the odds that he will be able to give the product of a randomly chosen pair of digits are ·8. The odds of his doing this three times are $(\cdot 8)^3$. Half of the problems in the present study involved two-digit numbers. Thus, the upper bound for the probability of success, P(S), on two- and three-digit problems as a function of proportion correct on the tables, T, is as follows:

$$P(S) < (T^3 + T^2)/2$$

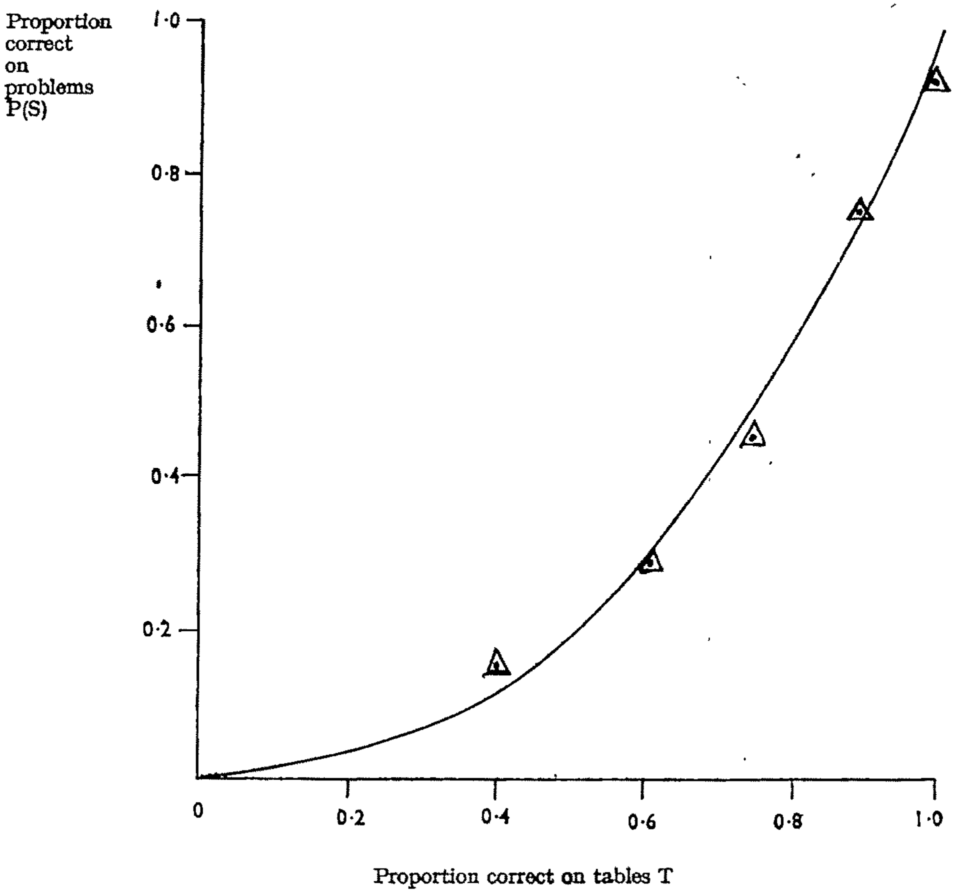
The function is graphed in Figure 1. This simple model predicted pre-test performance, on-line performance and post-test performance fairly well. For illustration, the figure shows mean tables post-test and mean criterion post-test scores of fifths of the sample. Notice that the function purports to give an upper limit. Multiplication involves more than recalling the products of pairs of digits. It also involves the operation of carrying, which is another potential source of error. Consider also that not all children will know the algorithm, and that those who do not will do very badly. Therefore, actual success should fall below the value prescribed above. In fact, however, actual success was often somewhat higher than the supposed upper limit. The explanation for this is that the children were frequently able to 'recover' products which they could not immediately remember. The tables tests were paced. This means the children generally were not able to answer unless they had immediate access to a product. The criterion tests and the practice sessions were unpaced. Since they had plenty of time, the children were probably often able to figure out a product they could not directly recall by such tricks as rehearsing the tables or counting from a nearby product they could remember.

The model helps one to understand why the active feedback group performed no better on criterion problems than the passive feedback group, despite doing somewhat better on the tables. The reason is that active feedback primarily benefited children who did badly on the tables. Figure 1 shows that improved competence at the tables begins to have a large effect on performance only as the child nears mastery.

A model of multiplication performance will be useful in adaptive teaching. The model will allow the computer to generate problems at a difficulty level which matches individual competence. General methods of doing this have been outlined by Woods and Hartley (1971). Since regulating task difficulty will affect the amount of feedback a student receives, such an adaptive strategy can be expected to influence learning, as evidence from the present experiments and a previous one (Woods and Hartley, 1971) suggests. Further, the model will be helpful in diagnosing the need for specific remedial teaching. If a child were to do substantially worse than expected from the simple model involving the recall of products, this would signal a deficiency in either the operation of carrying or in knowledge of the algorithm. To determine which deficiency, computer routines could be written that tested the child and evaluated his performance.

FIGURE 1

Comparison of Predicted and Actual Post-Test Scores as a Function of Knowledge of Tables.



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INDUCTION OF CURIOSITY VIA RHETORICAL QUESTIONS AND ITS EFFECT ON THE LEARNING OF FACTUAL MATERIALS

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SUMMARY. Lectures were delivered in two versions: one containing rhetorical question-and-answer sequences and the other with identical content but without the questions. The presence of rhetorical questions significantly enhanced the learning and recall of the facts presented in the lectures when artificially high levels of attention were counteracted by distraction or by the prior induction of boredom.

INTRODUCTION

In his theory of human epistemic curiosity, Berlyne (1954, 1960) stressed the significance of questions as a commonly used means to evoke curiosity. He proposed that information-soliciting questions, by confronting the individual with uncertainty, activate a drive state which motivates behaviour instrumental to the reduction of this state. A variety of behaviours may thus be induced, all terminating with the generation of an acceptable ' answer.' The answer need not be self-generated, however. An answer provided by an external agent, including the source of the curiosity-inducing question, should equally reduce the drive state—as long as the answer is considered an adequate one.

Berlyne's reasoning applies directly to the rhetorical use of information requests as characteristically employed in the teaching of factual materials. It may be argued that the rhetorical information question, by creating uncertainty and curiosity on the part of the listener, and the answer supplied by the communicator, by dispelling the uncertainty, serves to activate and then promptly reduce a state of aversive arousal (' drive ') and thus reinforces (cf. Hull, 1952) the acquisition of the answer as a covert response in the listener. This reinforcement is lacking when the information contained in the answer is conveyed without the preceding induction of uncertainty and arousal. Enhancement of the learning of factual materials presented in a communication involving the use of rhetorical information questions, compared to their presentation in a communication not employing such questions, may thus be expected, as a consequence of a higher degree of reinforcement provided in the curiosity-inducing communication.

The same predictions can be generated, however, without endorsing the presupposition of a drive operating toward curiosity satisfaction. Involving the idea of operant learning in a natural setting (cf. Zillmann, 1972), it may be assumed that in the process of acculturation the individual is rewarded for ' knowing the answers ' and punished for failures ' to come up with the right answer.' The mature language user, who must have undergone an extensive conditioning history under such reinforcement contingencies, should have developed a pronounced habit strength in responding with some answer to a direct question. This tendency to respond to a direct question is assumed to generalise to questions which are posed rhetorically. It is proposed that when the individual, thus motivated to answer questions, is induced via a rhetorical question to experience momentarily his ignorance and to engage in the preparation of an answer, he receives the presented answer in a heightened state of alertness and readiness to acquire an acceptable answer, resulting in superior learning of the factual materials involved.

Both rationales, Berlyne's drive-based curiosity theory and the operant-learning of the 'need to know' (or epistemic curiosity imposed by acculturation) emphasise the *motivation to acquire* specific information. Giving emphasis to the *motivation to attend* to communication, a quite different and independent rationale may be developed. It may be argued that the use of rhetorical questions produces a relatively dynamic oral presentation as compared to the more subdued presentation of information in statement form. Conceivably then, the information question may succeed in attracting and holding the listener's attention because the communicator's oral delivery is simply less monotonous. Moreover, if the communicator's rhetorical ability is considered better when he uses the question, he may be considered more intelligent and authoritative, and the resulting increased positive valence of the source may lead to increased motivation to attend and thus better learning by the audience.

MAIN EXPERIMENT

Method.

A major problem in research testing curiosity-arousing and attention-gaining mechanisms in the laboratory is that the typical experimental subject, finding himself in a novel environment for a relatively short period of time, and suspicious about the possibility that he might be called upon to remember what he has seen and heard, pays greater attention to whatever happens during the experiment than he would in a normal exposure setting. If optimal attention levels are secured by the setting itself, the further elicitation of attention will be superfluous, and potentially superior attention-eliciting techniques will not be able to manifest their effectiveness. To counteract the artificially high level of motivation to attend and learn, the present experiment included conditions in which attention to the critical speech was reduced via interference from a competing message. A competing message was used rather than other possible forms of interference, such as irrelevant noise or visual distraction, so that the subject would be able to comprehend only one message at a time and so that he would not know which of the two communications he should attend to. The subject exposed to both messages simultaneously was expected to selectively attend to parts of both messages, and to attend to the message which best induced attention and curiosity at any given time. It was reasoned that, although the student does not typically decode two competing messages at once, the use of competing messages might simulate a similar sort of competition frequently occurring in classroom situations—competition between the content of the lecture and the personal thoughts and preoccupations of the student.

Subjects.

Sixty-five University of Pennsylvania students, 35 males and 30 females, participated in the experiment. They were recruited by means of a posted announcement and received payment for their participation.

Design.

A 2×2×2 factorial design was employed. Factor A varied the grammatical form in which various elements of the manipulated communication were presented (statement *versus* question). Factor B varied the conditions under which subjects heard the manipulated communication (without *versus* with interference from a competing message). Factor C was the sex of the subject.

Communications.

Manipulated speech. In order to provide a communication upon which a test of recall could be based, involving a topic about which no subject could have prior knowledge, a speech was written containing factual-sounding, but actually invented information. The speech, supposedly delivered by a professor of anthropology, described a fictitious tribe of South American Indians. A brief introduction of the speaker, purportedly given by one of the anthropologist's colleagues, preceded the manipulated speech.

Interfering message. The speech used as the interfering message was adapted from an account of a tornado disaster in Arkansas. It reported, in the unemotional tone of a radio announcer, various details and statistics about the community's reactions. This speech appeared to be neither strikingly more nor strikingly less interesting than the manipulated speech. Such a choice was made to ensure that the attention of subjects would not be entirely with one speech or the other.

Manipulation of Grammatical Form.

The manipulated speech was written in two versions, the statement version, containing no questions, and the question version, containing 15 questions. For 10 of these questions, the transformation from question to statement form was accomplished by replacing the question-answer combination with a statement containing the factual information conveyed in the question and answer. To illustrate:

Question version: And how did we learn about the fighting? We saw burned villages from our plane when we first toured the area inhabited by the Quepo.

Statement version: And we learned about the fighting when we saw burned villages from our plane when we first toured the area inhabited by the Quepo.

The five remaining questions, which did not involve novel factual information, were simply omitted in the statement version. To illustrate:

Question version: Arriving there, we immediately knew that we had been right. This tribe wasn't just a part of the Quepo. How could we tell? It was obvious from their bone structure . . .

Statement Version: Arriving there, we immediately knew that we had been right. This tribe wasn't just a part of the Quepo. It was obvious from their bone structure . . .

For purposes of this experiment, care was taken to ensure that the critical facts to be remembered were given equal amounts of exposure in both versions.

Out of the 15 questions, five could be referred to as 'audience-involving' questions because they directly addressed the audience, employing the word 'you.' For example, "Can you imagine how . . ." and "How long do you think it took . . ." were used as question beginnings. Conceivably, addressing the audience directly, grammatically speaking, produces greater involvement, which may raise level of attention and curiosity and thus contribute to any effect resulting from the use of rhetorical information questions which do not address the audience in grammatical terms. For the purpose of this study, the use of 'you' questions was accepted on the grounds that such questions are typically used as rhetorical information questions and thus are part of the phenomenon investigated.

To produce the tapes of the manipulated communication, a speaker first recorded the basic text of the speech and then, under identical conditions, recorded the statement and question passages to be inserted. Two identical copies were made of the original, and the inserts were spliced in where appropriate to form the statement and question versions. The splicing was undetectable, and there were no unusually long or short pauses due to the splicing. Identical copies of the introductory remarks were spliced onto the beginning of both versions. The final tapes of statement and question versions ran 7 : 23 and 7 : 57 minutes respectively.

Manipulation of Reception Condition.

In the without-interference conditions, only the manipulated communication was played. In the interference conditions, the interfering message was played simultaneously with the manipulated communication. Volume levels for the two speeches were pre-set to ensure that both speeches would sound equally loud and that either speech would be comprehendable if selectively attended to.

Procedure.

The experiment was run in eight sessions, each involving approximately eight subjects. Males and females were tested at separate sessions. Two different experimenters ran the sessions, a male and a female, the sex of the experimenter always being the same as that of the group being tested. Both experimenters tape-recorded the verbal instructions ahead of time to maintain consistency in all of their four sessions.

As soon as all subjects had arrived, the experimenter announced that the instructions were on tape and proceeded to play the tape-recorded instructions. The study was introduced as an investigation of the perception of personality from voice. Subjects were told that they would be hearing a tape recording (or two tapes in the interference conditions) and that afterwards they would be asked to give ratings of the speaker(s). Additionally, in the interference conditions, they were told, " This experiment complicates matters somewhat by simulating what is called the ' cocktail-party phenomenon '—that is, you will be hearing two speakers simultaneously." The experimenter then played the appropriate tape or tapes. Subjects were not forewarned of the upcoming recall task.

After exposure to communication, subjects heard further recorded instructions, which informed them that another focus of the study was the retention of orally presented material under different conditions of task forewarning and different conditions of distraction. The tape explained that before they would rate the speaker's personality, they would take a test to determine how much of the speech (or, in the interference conditions, how much of one of the two speeches) they could recall. The experimenter handed out a booklet containing 18 questions tapping recall of the manipulated speech. None of these questions was phrased similarly to any of the rhetorical questions contained in the speech. All groups were given exactly five minutes to complete the test.

When time was called, the experimenter collected the test booklets and handed out a second booklet containing rating scales and questions about the speaker and his presentation. When all subjects had finished giving their ratings, the booklets were collected, and the subjects were debriefed and paid.

Dependent Measures.

The main dependent variable used in this study was the subject's score on the test of recall of the material presented in the manipulated communication. The questions were mainly of the open-answer or fill-in-the-blank type. Scores could range from zero to 28. The test responses were scored independently by two coders, who were unanimous in all their judgments. One of the coders was blind to the condition of subjects.

Secondary measures were taken to determine the effect of question use on rated source and message perception. Three measures assessed opinions of the speech presentation. Subjects answered the question, " How interesting did you find the content of the anthropologist's speech ? " by marking a geometrically presented scale ranging from -10, labelled ' extremely boring ' through $+10$, labelled ' extremely interesting.' They answered the question, " How would you rate his oral presentation and delivery? " by marking a similarly constructed scale ranging from -10, ' extremely poor,' through $+10$, 'extremely good.' They answered the question, " To what extent was the speech able to attract and hold your attention ? " by marking a similarly presented scale ranging from -10, labelled ' my mind wandered to a very great extent ' through $+10$, labelled ' my attention was held to a very great extent.' As a check on awareness of the technique used, the subject was asked to estimate the number of times the speaker used rhetorical questions and the number of times he directly addressed the audience with ' you ' in his sentences. Finally, ratings of source perception were made on 11 bipolar seven-point scales. These scales were adapted from those reported by Berlo, Lemert, and Mertz (1969). The scales used were: emphatic-hesitant, colourful-dull, active-passive, clear-unclear, organised-unorganised, understandable-uncomprehendable, authoritative-unauthoritative, intelligent-unintelligent, believable-unbelievable, intimate-remote, and friendly-unfriendly.

RESULTS

Test of Recall.

An analysis of variance was performed on the scores on the test of recall. As can be seen from Table 1, this analysis yielded no significant main effect of grammatical form, but a significant interaction between grammatical form and reception condition. The means associated with this interaction are shown in Table 2. Means with interference differed significantly ($P < \cdot 05$ by Newman-Keuls' test). Means without interference did not differ significantly ($P > \cdot 25$). As the table shows, the significant interaction derived from the fact that in the without-interference conditions, subjects exposed to the statement and question versions did not differ appreciably in the amount of factual material they recalled, but that under conditions of interference, the groups exposed to the question version scored significantly higher than those exposed to the statement version. This result bears out the earlier speculation that the curiosity-and attention-eliciting properties of the use of questions might manifest themselves in superior recall only if the artificially high levels of attention fostered by the experimental setting were reduced.

Table 1 also reveals that there was a highly significant main effect of reception condition. The means associated with this main effect, 15·6 for the without-interference conditions and 4·6 for the interference conditions, reflect the unsurprising outcome that subjects scored higher on the test of recall when there was no interfering message. Table 1 also reports no significant main effect due to sex and no significant interactions involving the sex variable. The performance of males and females was extremely similar throughout all experimental conditions.

TABLE 1

ANALYSIS OF VARIANCE OF SCORES ON TEST OF RECALL.

Source	df	MS	F	P
Grammatical form (A)	1	1·785	<1·0	
Reception condition (B)	1	242·314	81·645	·001
Sex (C)	1	1·849	<1·0	
AB	1	14·235	4·796	·05
AC	1	0·264	<1·0	
BC	1	3·184	1·073	
ABC	1	0·166	<1·0	
Error	57	2·968		

TABLE 2

MEAN SCORES ON TEST OF RECALL FOR COMMUNICATION AND RECEPTION CONDITIONS.

Grammatical form	Reception condition	
	Without interference	With interference
Statement	16·438	2·762
Question	14·714	6·375

Ratings of the Speech Presentation.

Analyses of variance were performed on the subjects' ratings of how interesting the content of the lecture was, how good the speaker's oral delivery was, and how well the speech held their attention. The grammatical-form variation did not exert a significant main effect on any of these variables—all associated F ratios being less than 1. Not surprisingly, there was a significant effect of reception condition on the ratings of attention paid to the speech, that is, the speech was rated as holding subjects' attention better when no conflicting message was present. Additionally, a significant interaction between grammatical form and reception condition was obtained in the ratings of the lecture's content ($F=5{\cdot}038$, $df=1/57$, $P<{\cdot}05$). This interaction pattern is similar to the one associated with the scores on the test of recall. In the absence of interference, the statement and question versions were rated as similarly interesting, whereas with interference, the statement version was rated as slightly less interesting than the question version (statement, $-1{\cdot}0$, question, $2{\cdot}3$, $P<{\cdot}10$ by Newman-Keuls' test). While differential assessments regarding the lecture's interest-value might have contributed to the observed difference in recall, it is also quite possible that these ratings were influenced by performance on the recall test. Conceivably, the fewer questions the subject was able to answer on the test of recall the less likely he would be to subsequently rate the speech as interesting.

Awareness of Techniques Used.

The estimates of the number of times the speaker used rhetorical questions and directly addressed the audience using the word 'you,' were subjected to analyses of variance. A significant main effect of grammatical form was observed for both variables. Subjects hearing the question version did, in fact, report noticing more questions. Their estimates of the number of rhetorical questions contained in the speech had a mean of 8·5, whereas the estimates associated with the statement condition had a mean of 0·3 (this comparison is associated with $F = 123{\cdot}255$, $df = 1/57$, $P < {\cdot}001$). Similarly, question-condition subjects gave a mean estimate of 5·4 'you' statements as opposed to a mean of 1·2 for statement-condition subjects (associated with $F = 18{\cdot}799$, $df = 1/57$, $P < {\cdot}001$). Neither of these two measures was significantly affected by reception condition, and the interactions between grammatical form and reception condition for both measures were also non-significant. It should be noted that the awareness reported might have resulted from asking for specific estimates after communication exposure, which may have forced the subject to rehearse the portions of the speech he was still able to retrieve; without such imposed rehearsal, awareness of the speaker's stylistic habits might not have arisen. On the other hand, it would appear likely that a listener takes notice of those stylistic features which make him pay attention.

Ratings of Source Perception.

The 11 scales on which the speaker was rated were subjected to analyses of variance. The grammatical-form manipulation exerted a significant main effect on two of these scales: authoritative-unauthoritative and intelligent-unintelligent. The speaker was rated more authoritative and more intelligent in the statement version (authoritative: statement, 5·4, question, 4·6, associated with $F = 5{\cdot}599$, $df = 1/57$, $P < {\cdot}025$; intelligent: statement, 5·8, question, 5·1, associated with $F = 6{\cdot}320$, $df = 1/57$, $P < {\cdot}025$). This outcome was unanticipated and remains to be explained. The only ratings which yielded a significant main effect of reception condition were, not surprisingly, the clear-unclear and the understandable-uncomprehendable scales—the speaker being rated as clearer and more understandable when no interference was present. The only significant interaction between grammatical form and reception condition occurred in the emphatic-hesitant ratings ($F = 4{\cdot}932$, $df = 1/57$, $P < {\cdot}05$). This interaction pattern parallels that of the recall scores and the ratings of the content of the lecture: without interference, the speaker was rated as similarly emphatic in the statement and question conditions, whereas with interference, he was rated as slightly less emphatic in the statement condition than in the question condition (statement, 3·8 ,question, 4·6, $P < {\cdot}025$ by multiple t test). Again, although it is possible that greater perceived emphasis under conditions of interference resulted in greater attention to the speech and thus in greater recall, it is also possible that these retrospective ratings were influenced by subjects' perceptions of their recall-test performances.

DISCUSSION

The results of the test of recall confirm the hypothesis that the presence of rhetorical information questions increases subsequent recall of the content of a communication when full attention and epistemic motivation are not stimulated by other means. The fact that the presence of questions led to no improvement in recall under optimal reception conditions appears to support the proposition that the effectiveness of questions is based on a curiosity-inducing or attention-eliciting mechanism. Given the present results, it seems likely that the failures of previous researchers (e.g., Lumsdaine, May and Hadsell, 1958 ; Kantor, 1960) to find recall differences between lectures containing rhetorical questions and those without questions were due to the fostering of high attention levels in all conditions.

REPLICATION UNDER CONDITIONS OF INDUCED BOREDOM

Because it might still be argued that the present use of an interfering message produced an *artificial* reception situation, and that the reported findings would not be generalisable to ordinary reception conditions, a replication of the experiment was carried out, in which high levels of attention were reduced by more natural means—through the induction of boredom.

It was reasoned that the high levels of attention paid by experimental subjects could be gradually reduced by exposing subjects to a series of long-winded, boring speeches. Therefore, it was decided that in the replication, the critical, manipulated speech would be heard after exposure to 20 minutes of uninteresting speeches on a variety of topics. To increase the generality of the findings, an entirely different speech, on a different topic—the art of a fictitious tribe in the Philippines—was written. It was manipulated in the same way as the speech employed in the main experiment.

Fifty-four Indiana University undergraduates participated in the replication· The session was introduced as a study of ' topic variety as a communication variable.' Subjects listened to a series of five unrelated speeches, the fourth of which was the manipulated communication. They were then given a surprise test of recall of the facts presented in the critical communication.

The scores on the test of recall replicated the results obtained in the interference conditions of the main experiment. Subjects who heard the question version of the speech recalled significantly more of the facts presented than subjects who heard the statement version. Out of a possible 31 points on the test, subjects exposed to the question version achieved a mean score of 10·056 ; those exposed to the statement version attained a mean score of 8·000. This contrast yielded an F ratio of 4·108 (df=1/52), associated with $P < \cdot 05$.

GENERAL DISCUSSION

The findings of the main experiment and the replication support quite clearly the expectation that the use of rhetorical question-and-answer sequences in a lecture enhances the learning of factual materials in an audience that is not otherwise highly motivated to pay close attention. All three rationales advanced predicted the obtained results with regard to recall performance. However, the rationale based on considerations of delivery style, which postulated that greater recall in the question conditions would result from a more dynamic delivery style, was not supported in the ratings of the speech presentation, and the related notion that the speaker who uses questions gains in perceived stature is clearly contrary to the ratings of source perception. The other two rationales, (*a*) Berlyne's theory of epistemic curiosity, and (*b*) the operantly learned tendency to generate and acquire answers to questions, were both supported by the data, but their specific adequacy cannot be further evaluated at this time.

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RESEARCH NOTES

SOME UNUSUAL CONSERVATION BEHAVIOUR IN CHILDREN EXPOSED TO TWO CULTURES

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Summary. Greek migrant children attending Sydney (NSW) schools and taught in English were tested for conservation of number and length in both Greek and English. They were pre-tested in both languages for understanding of the terms to be used in the conservation test. 25 per cent of children who passed the language pre-tests and failed to conserve in English, did show conservation when subsequently tested in Greek but again failed to conserve in a post-test in English. This finding is not in accord with Piaget's view of the inter-relationships of language and cognition.

The interest shown by recent research into the relationship of language to cognition prompted a study of the achievement of conservation among Greek migrant children who attend Sydney (NSW) schools where the language of instruction is English. Three random samples of children aged 6-11 years, total number being 183, were tested for conservation of length and number in both Greek and English, after preliminary tests for proficiency in both languages. They were drawn from communities which maintain ' Greek culture ' schools, which Greek children attend after normal school hours.

Some limitations were imposed upon the design since there are few testers available who have an understanding of Piagetian theory and a competence in both English and Greek. Most attention was accordingly concentrated upon subjects, proficient in the two languages, who failed the subsequent post-test in English having shown conservation when tested in Greek. The following paradigm outlines the procedure clearly.

English language test	*Conservation test in English*	*Greek language test*	*Conservation test in Greek*	*Conservation test in English*
Pass ⟶	Fail ⟶	Pass ⟶	Pass ⟶	Pass
Fail	Pass	Fail	Fail	Fail
↓	↓	↓	↓	
Out	Out	Out	Out	

It should be realised that precautions were taken to prevent subjects discarded before the post-test mixing with subjects yet to be tested.

As in the typical Piagetian test, conservation of length was tested by displacing one of two equal wooden prisms (15 cm × 1 cm × 1 cm) horizontally and later to a vertical position. Number conservation displaced one row of seven plastic discs (2·5 cm diameter) into a spaced row, a circle and an irregular group. In the language pre-test related to length, children showed their grasp of the terms ' same length,' ' longer than ' and ' shorter than,' by selecting appropriate sticks from an array of different lengths when a standard stick was put before them. Similarly, the grasp of the terms ' same number,' ' more ' and ' less ' was established by requiring the subjects to identify appropriate rows of discs from an array of rows containing different numbers. The Greek used is reported below:

(*a*) length: " Theixe mou (those mou) ena xylaraki macritero apo (kondotero apo) (ithio sto macros me) afto "

(*b*) number: " Theixe mou mia seira pou na echei ton ithio arithmo markes me (perissoteres markes apo) (lighoteres markes apo) aftin tin seira."

Results for length are given in Table 1, for number in Table 2.

TABLE 1

CONSERVATION OF LENGTH.

Sample	N	English Language		Cons. in English		Greek Language		Cons. in Greek		Cons. in English	
		Fail	Pass	Pass	Fail	Fail	Pass	Pass	Fail	Pass	Fail
A	55	21	34	27	7	1	6	6	0	4	2
B	78	19	59	37	22	3	19	9	10	6	3
C	50	19	31	16	15	2	13	7	6	2	5
Total	183	59*	124	80*	44	6*	38	22	16*	12*	10

* Eliminated.

The seventh column from the left represents the effective sample, i.e., those who passed both language tests, failed conservation in English and passed in Greek. Thus, the total effective sample for this table is 22. Of these, 10 failed the subsequent post-test in English conservation after passing the conservation test in Greek.

TABLE 2

CONSERVATION OF NUMBER.

Sample	N	English Language		Cons. in English		Greek Language		Cons. in Greek		Cons. in English	
		Fail	Pass	Pass	Fail	Fail	Pass	Pass	Fail	Pass	Fail
A	55	21	34	29	5	0	5	5	0	3	2
B	78	19	59	50	9	1	8	5	3	4	1
C	50	19	31	22	9	1	8	6	2	4	2
Total	183	59*	124	101*	23	2*	21	16	5*	11*	5

* Eliminated.

Again the seventh column from the left represents the effective sample of those who passed both language tests, failed conservation in English, and passed in Greek. These totalled 16 in this table, and of these five failed in the post-test of conservation in English after passing the conservation test in Greek.

Following is a fairly typical set of responses to the three length tasks in answer to the question "Are they the same length now ? "

(1) English : " No, that one is longer."
(2) Greek : " Yes, because when you put them back like before it's the same "
" Nai, ghiati otan ta valete mazi opos prin tha eine ithia."
(3) English " No." (Experimenter : " Which is longer ? "). " That one."

The writers realise that the evidence presented here is not conclusive and that a full design would be very desirable. It is also realised that issue can be taken with the language pre-test validity, though it is hard to see what behaviour other than that used here would demonstrate adequate understanding of the language phrases used. Even considering these two points, 25 per cent of the effective samples displayed fail-pass-fail behaviour in the conservation tasks after demonstrating a *behaviourally* acceptable grasp of the terms used. This is difficult to explain in terms of translation difficulties, and difficult to explain in Piagetian terms if translation difficulties are not the problem. It may well be that there is a much closer relationship of language and cognition to that hitherto supposed by Piaget. Certainly the area requires deeper and wider investigation.

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TWENTY-FIVE YEARS ON: A REPLICATION OF FLUGEL'S (1947) WORK ON LAY ' POPULAR VIEWS OF INTELLIGENCE AND RELATED TOPICS '

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SUMMARY. 575 adults drawn from both rural and urban areas completed a questionnaire designed and used originally by Flugel in 1947 to see how far lay opinions on intelligence reflect views held by professional psychologists and how far lay responses now differ from those reported by Flugel. Generally, lay and professional views have moved closer to question a one-factor view; men and women are seen to be equally intelligent; environmental influence on test scores is noted; a complete validity in intelligence tests is queried, as is a high correlation between tests and occupational performance.

INTRODUCTION

From responses to an original questionnaire, Flugel (1947) reported a comparison of popular views on the construct of intelligence with the opinions of professional psychologists. By 1972 ideas and research in this field had moved so much that, according to Butcher (1968), for many psychologists the construct of ' intelligence ' had become anachronistic. It seemed to the authors that Flugel's work would bear replication to check movement in lay response. Despite acknowledged weaknesses in the wording of certain questions the original questionnaire was adopted for this replication to see how far public opinion has changed, with the hope that invited written comments by respondents would elicit lay knowledge of the current state of the construct within psychology. Only 10 per cent of the sample took advantage of the invitation to add their own comments; so any reported lack of awareness of current psychological viewpoints may represent not the sample's ignorance so much as its disinclination to write comments.

THE STUDY

Instrument and Administration.

The questionnaire itself consisted of 16 items, with sub-divisions within five of them. The majority of questions carried a Yes/No dichotomy. Flugel's sampling design was admittedly weak, but again faith was kept with the original to the extent of an adherence to the occupational categories represented in his sample which consisted overall of 302 respondents (130 male, 92 female, 80 not recorded) whereas the present sample had 575 respondents (252 male, 323 female), gathered from two urban areas (325 subjects) and one rural area (250 subjects) of the East Midlands. Chi-square tests revealed significant differences in response between the rural and urban representatives on only one item in the questionnaire, so it was considered valid to combine the two to give an overall sample of 575. Flugel's percentages for his categories (ours follow in brackets) were: housewives 12 (27), civil servants 11 (10), factory workers 11 (6), engineers and mechanics 9(6), chauffeurs and ambulance drivers 9 (—), clerks and office workers 9 (9), students 9 (13), nurses 7 (5), miscellaneous 23 (24).

RESULTS AND DISCUSSION

Since Flugel had 302 respondents compared with our 575, it was decided to convert both his responses and ours to percentages to facilitate direct comparison. The letter U is used to indicate ' uncertain ' replies, either because respondents wrote in ' Don't know ' or failed to answer at all. Results and discussion are presented question by question, as were Flugel's.

Question 1—Are some people more intelligent than others?

	Flugel	S/B
Yes	99	99
No	—	1
U	1	—

If so, is this because:

	Flugel	S/B	χ^2
(*a*) They had better opportunities all round? ..	46	62	
(*b*) They had a better education?	35	61	P<·001
(*c*) They were born with better brains?	69	63	
(*d*) They have better health?	32	30	

Our sample, like Flugel's, was firmly convinced of differences in intelligence. However, there are differences between Flugel's results and ours in the spread of responses to questions 1 (*a*)—(*d*). Although in both cases the highest response was to (*c*) and although responses to (*d*) were very similar, our sample gave more weight to (*a*) ' better opportunities ' and (*b*) ' better education.' Responses to (*a*) and (*b*) in the present sample give support for Butcher's (1968) assertion that the weight of sociological argument may have influenced the public to place greater stress on environmental factors. Written comments mentioned many environmental influences on the development of measured intelligence, thus echoing the increased lay emphasis on environmental factors.

Question 2. If everyone had the same chance, would they all be equally intelligent?

	Flugel	S/B	χ^2
Yes	5	8	
No	94	92	NS
U	1	—	

Question 3. Do you think an intelligent person is usually:

(*a*) Better than most others at nearly everything (when he tries)?
(*b*) Better only at some special things, for instance, with his head or with his hands?
(*c*) Which is really characteristic of high intelligence, (*a*) or (*b*)?

	Flugel	S/B	χ^2
(*a*)	69	52	
(*b*)	39	63	P<·001
(*c*)	a=63 b=31	a=54 b=41	

The question was originally included to see whether people inclined to the general or group factor view of intelligence, and Flugel's sample affirmed their faith in Spearman's monarchic view, whereas ours inclines much more to a view of special abilities—intelligence to them is more situationally specific. However, when asked to answer part (*c*) the sample reverses its decision, so that 54 per cent vote for (*a*). Obviously some people in both samples answered both (*a*) and (*b*) and Flugel felt that the question was not worded sufficiently well to distinguish whether intelligence is generally or relatively specific, and whether it shows itself best in intellectual or manual work.

Question 4. Do you think it possible to measure a person's intelligence so that a poorly-educated and a well-educated person would stand an equal chance of showing the brains they started with?

	Flugel	S/B	χ^2
Yes	62	53	
No	34	45	P<·01
U	4	2	

Although responses are still in the affirmative, there would seem to be a trend for intelligence tests to win less acceptance than they did a generation ago, a reflection perhaps of both lay and professional attacks on intelligence tests as part of 11+ selection. However, overall the score still lies in favour of the reliability and validity of intelligence tests. Written comments stressed the difficulties of cross-cultural testing, and the increased chances for test sophistication by the better educated.

Question 5. Supposing such a measurement could be obtained (let us call it ' general intelligence '), would you object to your own ' general intelligence ' being measured ?

	Flugel	S/B	χ^2
Yes	8	16	
No	91	83	P<·01
U	1	1	

The responses still accord with those of Flugel. The percentage of objectors, however, doubles.

Question 6. If some people do object is this because :

(*a*) They might feel worried or ashamed ?
(*b*) They think the test might not do them justice ?
(*c*) They think the results might be unfairly used ?

	Flugel	S/B	χ^2
(*a*)	60	55	
(*b*)	58	47	NS
(*c*)	32	30	

Again, overall agreement with Flugel although responses to his (*a*) and (*b*) were much more equally weighted than ours. Written comments stressed objections against any form of bureaucracy (not defined) and suggestions that people over forty may feel shame at a lack of education (and hence of intelligence) whilst those aged 30 plus would feel ashamed that they had had an education yet still remained unintelligent.

Question 7. Do you think this sort of measurement of ' general intelligence ' would help find the right man for the right job ?

	Flugel	S/B	χ^2
Yes	75	58	
No	22	41	P<·001
U	3	1	

Here we see less confidence from our sample than that displayed by Flugel's. Comparison of our male and female responses showed that the female scores were an overwhelming influence in giving the sample's overall affirmative response ; without that female contribution Flugel's findings might well have been reversed. Written comments stressed the importance of endurance in job performance, and of ability to elicit co-operation and loyalty of colleagues and subordinates, plus general temperamental qualities required for specific jobs.

Question 8. Do rich people (enough of them to matter) hate to think that poor people can be born with as good brains as theirs ?

	Flugel	S/B	χ^2
Yes	46	50	
No.	46	46	NS
U	8	4	

The position is little changed since 1947. Written comments stressed ignorance of the attitudes of rich people and the fact that middle-class children seemed well represented in grammar schools.

Question 9. Do rich people (enough of them to matter) object to poor children, however clever, having the same educational opportunities as theirs ?

	Flugel	S/B	χ^2
Yes	62	49	
No.	32	49	$P < \cdot 001$
U	6	2	

There has been a substantial increase in the negative responses. Conflict theorists, of course, might argue that the rich do object, but have won their way astutely by admitting more of the poor to their own life-styles and attitudes, by allowing them better educational opportunities, a point expressed strongly in the written comments along with suggestions of a perceived selfishness and snobbery among the rich.

Question 10. If there are some who do object, is this because :

(*a*) they think their wealth or power would be in danger ?
(*b*) they think there would be too much competition for the better jobs ?
(*c*) they think too few will want to do the dirty jobs ?
(*d*) or is it for the most part just class prejudice ?

	Flugel	S/B	χ^2
(*a*)	53	44	
(*b*)	51	59	
(*c*)	48	55	$P < \cdot 05$
(*d*)	65	79	

The main change is a difference in the spread of responses. Although (*d*) ' class prejudice ' still receives the highest response, more weight is given to questions of job competition, as covered by items (*b*) and (*c*). Written comments considered the question to be irrelevant, outdated, too hypothetical, or biased towards a response which would involve class distinction.

Question 11. Are rich people on the whole a bit more intelligent than poor people ?

	Flugel	S/B	χ^2
Yes	44	30	
No.	52	68	$P < \cdot 001$
U	4	2	

The present sample reject more firmly suggestions of greater intelligence on the part of the rich. The written comments of respondents referred to the equation of education with increased life-chances, so that the intelligent are more likely to become rich. There seemed a general belief that wealth or intelligence could be seen as both dependent and independent variables.

Question 11 produced a difference in response ($\chi^2 P < \cdot 01$) between the present authors' rural and urban samples. The rural respondents gave the greater response in the negative.

Question 12. Do you think that ' intelligence tests ' are better than ordinary examinations for finding out the brains a person was born with (as distinct from what he has been taught) ?

	Flugel	S/B	χ^2
Yes	80	71	
No	16	27	$P < \cdot 001$
U	4	2	

Although there is still a belief in the efficacy of intelligence tests, more people give negative responses than in Flugel's day. Written comments questioned the ability of psychologists now or ever to devise ' adequate ' tests.

Question 13. Should young people be able to go to any school or university they choose without having to pass an examination or intelligence test to get in ?

	Flugel	S/B	χ^2
Yes	21	19	
No	77	81	NS
U	2	—	

The present results are similar to Flugel's. Respondents' written comments stressed a need for more flexibility in the system so that people could change career-lines more easily. Others in favour of open entry saw the need for proof of some ability in entrants but did not specify how such ability would be formally recognised.

Question 14. At which of the following ages do you think a person's intelligence is fully developed—as distinct from what he has learned?

Age	5	15	25	35	45	55	65	U	χ^2
Flugel	4	26	28	22	6	2	1	11	$P<\cdot001$
S/B	8	18	42	20	5	1	2	4	

Clearly, 25 has become the strongest suggested age. Only two written comments tended to accord with the findings of psychologists that for, say, teachers and solicitors, high verbal reasoning scores will continue well into the thirties and beyond, and that it is the time limit imposed by certain tests and the speed factor which prove decisive.

Question 15. If a child's intelligence is measured when he is between 8 and 10, can we get an idea of how intelligent he will be when he is grown up?

	Flugel	S/B	χ^2
Yes	52	48	
No	41	52	$P<\cdot02$
U	7	—	

There is no longer a majority belief in the constancy of measured IQ, although comparison of our male and female responses show that it is the men who have produced the swing in opinion ($\chi^2 P<\cdot01$), while women in our sample would still agree with Flugel's results.

Question 16. Which of the following is true?

(*a*) Men are more intelligent than women.
(*b*) Women are more intelligent than men.
(*c*) Men and women are equally intelligent.

	Flugel	S/B	χ^2
(*a*)	25	12	
(*b*)	3	5	
(*c*)	67	82	$P<\cdot001$
U	5	1	

There is increased agreement for equality in intelligence at the expense mainly of a belief in male superiority. Examination of male and female responses in our sample showed that twice as many males believed themselves to be the more intelligent sex (17 per cent as against 8 per cent of women). Written comments argued that campaigns for equal pay and Women's Liberation would produce the responses which we, in fact, obtained and suggested that surveys of intelligence in school children would see girls as the superior sex. No comments showed awareness of the work in psychology recognising different variabilities in male and female intelligence testing results or of the tendency of women to score higher on verbal and coding tests, and men on spatial abilities and tests of mechanical perception and reasoning.

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ANNUAL SURVEYS OF READING DISABILITY IN A SCOTTISH COUNTY

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Summary. During the past 11 years the Child Guidance Service in Angus, Scotland, has carried out an annual survey of the reading attainment of all 7-year-olds (averaging 1,500 children each year), using (from 1963) the Vernon Graded Word Reading Test. Individual follow up annually of between 100 and 200 children who have made a very poor start in reading has been undertaken. In 1969, a further reading survey of 10- to 11-year-olds showed that just over half of the children considered seriously backward in reading when tested at 7 to 8 years of age, were still seriously backward at 10 to 11 years of age. Over the years there has been fluctuation in the size of the very backward group, with a rise in the percentage considered very poor readers in each of the four years 1967 to 1970. Some improvement was shown in 1971 and 1972.

INTRODUCTION

Studying educationally backward children and advising on their handling has for long been laid down in the Education Acts as one of the duties of Scottish Child Guidance Services. Severe and persistent backwardness in reading has caused particular concern to the service because it undermines progress in all school work. The use of reading surveys in Angus predated the current unease about reading standards, expressed for example, in two recent NFER publications (Cane and Smithers, 1971; Start and Wells, 1972); and from their beginning in 1962, reading surveys were intended to focus attention on reading disability, to create concern and to provide some of the ground work necessary for remedial measures.

PROCEDURE

The work carried out can be considered in three parts:

(1) *Annual Reading Surveys.*

Each year, from 1962 to 1972 inclusive, all children who were aged 7 but not yet 8 participated irrespective of school class. The bulk of children were in Primary 2 and 3, but a few from Primary 4 and a few late entrants retarded in Primary 1 came within the appropriate birth dates. Testing was carried out by class teachers. One aim was to give teachers in the county some experience of a standardised test and to demonstrate its value to them. An individual test rather than a group test was selected because of the one-to-one relationship in testing One disadvantage of a group test is that it can be all too easy to mark and pass on the results without considering them in relation to individual children. In 1962 Schonell's Graded Reading Vocabulary Test was used, and from 1963 Vernon's Graded Word Reading Test, which has the advantage of Scottish norms. Children receiving special education were included in survey testing but excluded from the results.

Detailed instructions were specially prepared together with score sheets on which were recorded the date of birth of each child together with the score pattern of success and failure for all words read in order to allow adequate checking. Results were collated by the Child Guidance Department. The school population in Angus has grown during the past 11 years and the number of 7-year-olds tested annually increased from 1,300 in 1962 to 1,600 in 1972.

(2) *Annual Follow-up of the Poorest Readers.*

Children between 7 and 8 years of age able to read fewer than 10 words of the test (Reading Age less than 6 years) were considered to be ' at risk.' Such children were listed according to school attended and seen again individually during the next session by the Child Guidance staff. In every case further reading testing was carried out using Daniels and Diack's Standard Reading Test, together with such other psychological investigation as deemed necessary. Annually, a small number of children hitherto unknown to be mentally handicapped were thus discovered. Individual difficulties were discussed with class teachers. Possible causal factors such as sensory deficiency, absence, changes of school, lack of home support, reading methods and materials were all considered, and remedial measures suggested.

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(3) 1969 *Survey of* 10- *to* 11-*Year-Olds.*

To throw light on the usefulness of a reading survey based on a Word Recognition Test at age 7 as a prognosticator of later reading attainment, a further survey of the reading of children aged between 10 years 3 months and 11 years 2 months was carried out in 1969. This testing was also undertaken by class teachers using the National Survey of Attainments Test, Form NS6. This is a group test involving comprehension and speed. A year group of 1,390 children took part. The 10- to 11-year-olds tested included the bulk of children tested in 1966, at 7 years of age, for reading survey purposes.

RESULTS

Annual Surveys.

Annual surveys have always shown a wide range in reading attainment of 7-year-olds in Angus as measured by a Word Recognition Test. Table 1 showing the 1972 results is typical.

TABLE 1

Reading Attainment of Seven-year-olds : Vernon's Test.

No Score	Reading Attainment (Reading Ages in Years)									Absent	Total
	5–5·9	6–6·9	7–7·9	8–8·9	9–9·9	10–10·9	11–11·9	12–12·9	13 and over		
17	188	269	409	393	180	91	15	10	2	29	1603

Some children were unable to score at all, and a few had the reading vocabulary of the average 12- or 13-year-old. There was considerable variation between schools, some showing consistently good results with a very small percentage of very poor readers. Other schools were consistently poor with one child in four, or even one in three, coming into the 'at risk' category by the time they were between 7 and 8 years of age. Schools have different problems. The aim was to study the problem of reading disability and to consider ways of tackling it rather than to make comparison between schools.

Fluctuation of Results.

In 1967, there was a totally unforeseen rise in the percentage of very poor readers. Each of the years 1968, 1969 and 1970 were worse than the previous one. Poor results were not confined to a small number of schools or to any one type of school: they were widespread and general, and the depression affected town and rural schools alike. The difference between the 1966 and 1968 figures was statistically significant at the 1 per cent level both on chi-square and the t-test of significance of difference between means. There was some improvement in the results in 1971, and this was maintained rather than bettered in 1972. The 1972 results are still poorer than those of 1966. Table 2 shows the percentage of very backward readers from 1963 onwards.

TABLE 2

ANNUAL READING SURVEYS : PERCENTAGE OF SEVEN-YEAR-OLDS ONE YEAR OR MORE BACKWARD IN READING

Year	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
All Schools	9·9	10·4	8·6	8·4	11·0	13·5	14·6	15·0	12·9	12·7

The 1962 results are omitted because the Schonell test was used, and the figures are therefore not comparable.

Survey of 10- *to* 11-*Year-Olds.*

From the 1969 survey of 10- to 11-year-olds the performance on the NS6 test of the 117 most backward readers when tested at 7 years on the 1966 survey, was carefully scrutinised. Of the 117, 88 remained in the county and had been included in the 1969 survey. Of these 88, all but eight were still backward readers and 51 (58 per cent) obtained a RQ of less than 85 and were therefore considered to be still seriously backward. They had been joined by another 43 children who had not been identified as ' at risk ' at 7 years of age though at that time the reading attainment of all but six was below chronological age level. This is in line with the finding of Morris (1966) that children with a reading problem in the second year of the primary school are likely to remain very poor readers to the end of their school days, and that children who have not made a real start in reading by 8 years of age can expect to experience continuing difficulty, with reading disability persisting into adult life.

DISCUSSION

Criticism of the Test.

The use of a Word Recognition Test has evoked some criticism. Reading vocabulary is the most basic and least sophisticated form of reading test. Children may score well in this type of test and still be deficient in speed, fluency and comprehension. If, however, they fail to recognise the words at all, speed, fluency and comprehension are all irrelevant. More specifically, the use of Vernon's Graded Word Reading Test has been queried, since the test was published in 1938 and it is maintained that the words used are no longer the words which children starting reading would be expected to know. The 7-year-olds tested need to recognise only the first 10 words to achieve a Reading Age of 6 years, which places them outside the ' at risk ' category. Of these 10 words, six appear amongst the first 200 *Key Words to Literacy* (McNally and Murray, 1962). The seventh word, without the ending ' ing,' also appears amongst the key words. The remaining three are strictly phonetical, requiring children to know some of the commoner digraphs.

If the criticism that the test was becoming out of date were valid, it could be expected that the reading results would become progressively worse as the test continued to age. The results have, in fact, improved in 1971 and 1972. Whatever the criticisms of the test, it was satisfactory for the screening purposes for which it was used in that it did identify backward readers.

Importance of the Results.

It is possible that changes in educational practice which entail less pressure on children delay the start of reading. If this is the case, the effects could be either that more mature children read more easily and eventually reach the same standard, or that there will be an increasing number of poor readers throughout the primary school with stumbling reading undermining the educational progress of a larger percentage of pupils, making their admission to common courses in the secondary department the more difficult. Early mastery of reading is fundamental to the whole approach of the Scottish Education Department's Memorandum, *Primary Education in Scotland* (1965), which lays so much stress on activity methods and 'finding out.' The annual survey results suggest that there is a group of 7- to 8-year-olds not adequately equipped with the necessary skills to benefit much by the use of these methods.

In a sense, all thinking in terms of reading ages and norms is artificial. The only acceptable standard of reading in the 1970s is for all children with the ability to do so to have achieved useful reading, that is, being able to read for information and for pleasure by the time they leave school.

CONCLUSIONS

From the work carried out a number of points emerge :

(1) There was a wide range in the reading attainment of 7-year-olds as measured by the Vernon Graded Word Reading Test.

(2) By 7 to 8 years of age, there is a group of children who are likely to have serious difficulty with reading unless given help.

(3) The size of the group experiencing severe difficulty has fluctuated over the years, and increased continuously from 1967 to 1970.

(4) Further testing of one group of 10- to 11-year-olds showed that rather more than half the children identified as very poor readers at 7 years of age, remained seriously backward when between 10 and 11 years old.

(5) While the survey testing of 7- to 8-year-olds had not placed in the 'at risk' category all those who were later found to be seriously backward readers when aged between 10 and 11 years, it had at least shown that the majority of them were already backward readers by the time they were 7 to 8 years of age.

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CRITICAL NOTICE

PERSONALITY GROWTH AND LEARNING

Open University (Faculty of Educational Studies): Course E281

BY G. SETH

(The Queen's University of Belfast)

WILLIAMS, P., the COURSE TEAM *et al.* (1971). *Course Units* 1-17, 7 vols. pbk, Bletchley: Open University Press.

CASHDAN, A., and WHITEHEAD, J. (Eds.) (1971). *Personality Growth and Learning: A Source Book*, pp. viii+415. London: Longman for the Open University Press.

Note (*i*). Nine topics are covered in 17 course units arranged in seven volumes as follows:

I—Learning Styles
- 1 Learning styles and strategies
- 2 Convergers and divergers.

II—Creativity
- 3 The concept of creativity
- 4 The structure of creativity

III—Personality Dimensions/Motivation
- 5 Personality dimensions and achievement
- 6 Motivation and learning
- 7 Changes in motivation

IV—Social Relationships
- 8 The Group (by M. Argyle)
- 9 Sociometry
- 10 The Self-concept (selected readings)

V—Maladjustment
- 11 The maladjusted child
- 12 Maladjustment and learning: assessment problems

VI—Attitudes/Learning Problems
- 13 Attitudes and learning (with B. Commins)
- 14 The slow-learning child
- 15 Culturally disadvantaged children

VII—Intervention in the Classroom
- 16 Intervening in the Learning Process I (by D. Moseley).
- 17 Intervening in the Learning Process II (by D. Hamblin)

Except for 8, 13, 16, 17 as noted above, the units were prepared by five members of the Course Team: Bynner, J., 5, 6, 7, 13; Cashdan, A., 1, 11, 14, 15; Lee, V., 2, 3, 9, 10 (Ed.); Whitehead, J. (with Bynner), 6; Williams, P., 4, 12.

W. Prescott, of the Open University Institute of Educational Technology, was responsible for the developmental testing of the course. The Team included in addition five members of the Open University and BBC staffs, all with experience of radio or TV production in the field of higher education.

Note (*ii*). Associated with each main topic, except Personality Dimensions, there is a TV broadcast, and with each course unit a radio broadcast. These two sets of programmes do not duplicate each other.

Note (*iii*). Set Books. The textbook for the course is *Personality Growth and Learning* (Eds. Cashdan and Whitehead). Other set books are:

Crocker, A. C. (1969).	*Statistics for the Teacher.*
Hudson, L. (1967).	*Contrary Imaginations*
Vernon, P. E (1964).	*Personality Assessment.*
Vernon, M. D (1969).	*Human Motivation.*
Argyle, M (1967).	*The Psychology of Inter-personal Behaviour.*
Evans, K. M. (1965).	*Attitudes and Interests in Education.*
Bowlby, J. (1965).	*Child Care and the Growth of Love.*
Holt, J. (1969).	*How Children Fail.*

Epigraph. The Course Team speaks for itself in the *Introduction to the Course*:

" The growth of children's personalities is as important to education as the learning which takes place in the classroom. These two themes, personality growth on the one hand and learning on the other, have for long been important but relatively distinct areas in educational psychology. In planning the first of the

Faculty of Educational Studies courses in the general field of educational psychology, we decided to produce a course which would link these normally separate areas and which would highlight ways in which personality growth and learning mutually influence each other . . .

" For the purposes of this course we have taken a view of personality which brings into the foreground non-intellectual characteristics, such as feelings, emotions, attitudes, etc. Similarly . . . we have taken a somewhat narrower view of learning than is often adopted. We have set the course as far as possible in the classroom context, and it is *classroom* learning, the acquisition of the intellectual skills that the education process emphasises, with which we are mainly concerned. So the central theme . . . is the way in which non-intellectual qualities relate to performance in the classroom."

The reviewer makes his personal reaction (with helpful feedback from most of those who were his colleagues as Course Tutors for E281 in Open University Region 12 (Northern Ireland), as well as from some thirty odd students, randomly selected from their groups, who completed an informal questionnaire).

In the lengthening shadows of Padua and Paris, Oxford and Cambridge, Heidelberg and St Andrews, the universities have found it hard to forego the basic techniques of their medieval predecessors, and to take advantage of the potentialities of modern educational technology. With the concept of the Open University, Jenny Lee, now Baroness Lee of Asheridge, brushed aside cherished cobwebs of tradition and provided some sort of statutory climax to Raymond Williams's ' Long Revolution.' The Open University has, therefore, had to devise a course-structure and adopt novel action-at-a-distance teaching methods appropriate to a vast, vastly heterogeneous, and geographically widely scattered student body.

Face to face contact of teacher and taught being impossible, the University resorted, not primarily nor principally to radio and television presentation, but to the most ancient significant breakthrough in the technology of communication—printing—and the principle of correspondence teaching. Books were available; they could be multiplied in profusion; they could be created *ad hoc* by the University itself; they could be retailed relatively cheaply in the captive market. The oratory of the lecture-room could be supplanted, as many undergraduates for long have argued that it should be, by a series of correspondence units prepared with remarkable thoroughness and presented with a high degree of technical skill and sophistication. The titles of these for E281 have been listed above They amount in all to just under 700 pages, or hardly less than 400,000 words of elegant letterpress, filled out with superbly clear and adequate diagramming and tabulation, as well as suitably unpretentious pictorial material, employed only where it contributes effectively to the text.

Deprived of the familiar, interactive informality of the spoken word, some of the writers of the units have been able to achieve on paper—as James did superlatively well, or Hebb from time to time, or my own old teacher, Godfrey Thomson—an admirably personalised *teaching* style (e.g., Williams, Unit 4). Not all, of course, are equally successful. On the evidence of my admittedly small sample, student opinion was clear that Units 2-4, 11, and 12 were on the basis of a simple head count, the most satisfactory in respect of level of difficulty, interest and usefulness. Units 5, 6 and 7 were all considered to be difficult, although they stood up reasonably well for usefulness. Unit 10 was equally difficult, split the group in terms of interest, but was not seen to be very useful. This last was indeed the unit about which student opinion was most divided, and with which many were uncomfortable. A limited opinion poll of this kind will hardly bear generalisation, but I should on the whole agree with the students' diagnosis of difficulty. Unit 10 is unique in the series, consisting as it does of eight selected readings loosely linked by the bare minimum of comment by the editor, Victor Lee. They are good selections, but the first two would be long and exacting by any standard, demanding a high degree of concentration and still more of psychological sophistication. The first is on The Self and Interaction, being Chapter 9 of Argyle's *Social Interaction*, and the second, on the Psychosocial

Development of Children, is an interrupted monologue by Erikson, extracted from *Discussions in Child Development*, edited by Tanner and Inhelder. Lee was aware that the unit was experimental in form, and he may well have been apprehensive of a negative outcome. The reason is fairly clear. Primary sources are never easy reading for the beginner. At final honours level, after two or three years' study of the subject, the best of the students might be able to cope with such a weight of original material relatively independently. But it is unreasonable to expect that students-in-general who have had no significant lead-in will be able to do so. The difficulty was surely aggravated by the total unfamiliarity of Erikson's psychoanalytic approach.

Unit 5 was rated as interesting by quite a number of students, but along with Units 6 and 7 it was found to be difficult. These papers are conventional enough in form, consisting largely of interpretative exposition built around a number of research studies or theoretical positions but (i) the information content is high; (ii) the terminology is at times difficult and forbidding; (iii) the emphasis on methodology is heavy; and (iv) there is a demand for understanding of statistical concepts that is unrealistic. Lecturers quickly realise that the number of unfamiliar ideas that can be put across in the normal lecture hour is fairly limited. The writer of a ' unit ' or a book has no feedback and is less immediately alive to the kind of mental dazzle likely to be produced by too high a degree of conceptual density. Fatigue rapidly sets in if the reader has to *translate* too many sentences; the task becomes impossible if his ignorance of the material is such that he cannot translate or properly follow the thread of the argument.

The broadcast element is a standard part of the Open University course pattern, and depends heavily upon the mass of experience and the number of expert staff that the BBC has built up in the exploitation of the media of radio and television at all educational levels. In E281 both have been employed to provide auditory and visual primary source material associated with the units. So Unit 3, the Concept of Creativity, includes on radio, Creativity: A Personal View, in which Roy Fuller reads and comments upon one of his own most striking poems, while a critical discussion of it by Professor Kettle, Professor of Literature at the University, is included with the unit itself. Linked with Unit 9, Sociometry, is the radio programme, *The Two Worlds*, in which two groups of children are recorded as they talk with their teachers, so that linguistic differences can be directly observed. Other programmes are of a more conventional kind. Eysenck, Entwistle and Furneaux discuss the discrepant results that they have obtained from similar experiments discussed in Unit 5. Professor Hunt is interviewed about his views of motivation and about their implications for classroom practice and compensatory education.

All this is, in principle, admirable as presenting ' live ' material to encourage the students to *think* about their course material. The TV programmes are designed to elicit active response in the form of, e.g., recorded observations by the student, and it is hoped that he will be able to appreciate the way in which printed unit and broadcast programme are integrated. But teachers who can have no immediate feedback must be realistic. Student comments suggest a surprising coolness about the broadcasts. Only half of the Northern Ireland group had seen or heard more than half, and a quarter none at all Teachers must not be over-optimistic about the extent to which instructions, however persuasively framed, will be followed when much is left to the achievement motivation, initiative, and sheer effort of the student. Of those who took in a number of the programmes, it is doubtful how many seriously attempted the relatively simple activities involved. Listening or viewing commonly seemed to be enough, and the students, I suspect, regarded the programmes as at best supplementary rather than complementary, and few referred to them in their written work. Tutors, of course, should do more to encourage interest, and my comments are neither cynical nor fatal. In so far as any particular course of study involves the acquisition of a certain mass (? Herbartian) of experience, then for those students who took in a significant amount of the wealth of material provided, it may have been effective in ways that would not be adequately tapped by any examination paper or essay.

The Cashdan-Whitehead Reader stands up well in its class All the papers are directly relevant to the units, but the book could be a useful adjunct to any course in educational psychology, particularly so for the M.Sc. professional programmes. The balance is well held between American (13 papers) and British material. The former are mainly, though not entirely, theoretical/experimental in emphasis and many are well-known and generally acclaimed (e.g., Hebb on *Drives and the CNS*; Hunt (2) on motivation, with a developmental and educational bias; Guilford, the original influential creativity paper from the *American Psychologist*; Witkin on dependence/independence and Kagan on reflection/impulsiveness—the former less obviously of direct educational relevance; the latter more so, but perhaps less easily digestible; both, however, important, as are Units 1 and 2, in calling attention at the outset to recognisable, measurable differences between individuals in the learning situation). Of the 16 papers by British writers, most report research studies carried out in an English setting (e.g., Eysenck and Cookson; Haddon and Lytton; Swift; Mitchell and Shepherd, Chazan). Most are good or very good, and Chazan's article on maladjustment in ESN children is in the present context quite excellent.

From every point of view this is a very useful and, usually, realistic collection, cheap at the price. But I should be unsporting enough to suggest discarding a few of the papers in a later revision. Watson on cigarette smoking is hopelessly muddled in presentation, innocent of clear design, and serves only to demonstrate how *not* to report an experiment. The BPS report on the School Psychological Service is as bland as a cultivated mushroom, gone musty after prolonged storage. Jackson and Messick supply a dull, unintentionally pretentious account of creativity, which makes little contact with the classroom, and is uninspired in its speculations about divergent eminence. Lunzer, on aggressive and withdrawing children, says nothing very conclusive, and Woody is doctrinaire and categorical about counselling.

The two unassuming *hors d'oeuvre* papers by Sarbin and Coe, extracted from their *Student Psychologist's Handbook*, strike an important and admirable introductory note for the book, and, indeed, for this and many other courses for beginners. Each excerpt makes its essential point in a single sentence, both of which deserve quotation. (i) On the essential statistical guidelines for the reading of experimental papers: "One of the primary tasks in using others' observations is to evaluate the way in which they were made in order to determine their usefulness." This appears to have been the motto for many of the correspondence units, but less attention, unfortunately, has been paid to the important monitory, but encouraging wisdom of the other. (ii) "The beginning student should be cautioned against becoming over-involved in the fine details of research presentation, lest he lose sight of the general conclusions and their implications."

If the first of these two statements is central to the teaching approach of the Course Team, the second is relevant to their plaintive anxiety about statistics and all that "One of the particular problems that concerned the Course Team was the difficulty of choosing illustrative material which did not include technical concepts—especially statistical terms and ideas—which you might not have met previously. We were not able to solve the problem." Now Sarbin and Coe had anticipated this, and one aspect of their answer is simply "Not to worry!"

So far as E281 is concerned, however, these things must be said:

(i) Crocker's set text (*Statistics for the Teacher*) will not do. This muddled primer in arithmetic too often itself illustrates the very difficulty that concerned the Course Team.

(ii) Statistics can be, and commonly is, taught as part of a laboratory course in psychology or research methods in education. *But E281 is neither*. An attempt to incorporate in such a course as this the learning of computational skills in the hope that the virtue of statistical reasoning will be added painlessly is counter-productive ·

(iii) The basic statistical *concepts* necessary to sufficient understanding of the papers in Cashdan and Whitehead or the course units are not beyond the grasp of the non-mathematician. But he cannot learn about them through the mathematical derivation of the appropriate formulae, nor by going through the motions of calculating a correlation co-efficient by any method, however simple.

(iv) A single 'practical' assignment of the kind set for E281 may be of some value as an exercise in psychometrics But the 'Noddy statistics' (Cf Levy, P., Psychological Statistics, *Bull. Br. Psychol. Soc.*, 26, p. 9), carried out to the step-by-step dictates of a programme are mere 'busy work.'

Consequently, my conclusions would be that (*a*) formal work in statistics should not be included as an *incidental* feature of E281 ; (*b*) the teaching of some statistical *concepts* (e g., variable, central tendency, dispersion, correlation, significance) should be based on Sarbin and Coe's first Reader article and should be the subject of discussion by the Course Tutor, supported by a *brief* supplementary paper circulated to all students by the Course Team ; (*c*) all this material might be made the basis of a computer-marked assignment early in the course, primarily to encourage the study of it ; (*d*) some 'practical' work in the classroom could still be included in the course, but it should not be presented in a quasi-research guise, and statistical computation (if any) should be minimal.

Matters of technique and the detail of presentation cannot be completely separated from matters of content which may be fundamental to the way in which the course has been conceived. It may be agreed that no two lecturers or departments will write the same course to deal with any given area of subject matter, but legitimate questions may arise about, for example, whether the course does what it had set out to do, whether a declared theoretical position has been consistently maintained in the exposition, or whether the content and its presentation are appropriate to the 'level' of the audience. In the particular case the words 'personality growth' in the course title carry a specifically developmental implication which is not rigorously followed in the expanded discussion. Psychometric instruments, whether tests of intelligence or of the non-intellectual aspects of personality, commonly pose more questions about development than they answer. An account of personality—or, indeed, of cognitive process or anything else you care to name—does not become a developmental study merely because the subjects of the experiments cited, or the persons to whom we apply our tests, happen to be children. The social psychologist may not pass cavalierly by the biological origins of the behaviour he endeavours to explain—Argyle does not—and the educational psychologist who uses a term like growth is committed to a developmental account involving some emphasis upon the roots of the growing personality and to indicating in what sense growth is taking place in terms of elaboration and specification. Development is a continuous *process*, and if we except Erikson's somewhat esoteric account (Unit 10), I believe that this continuity is less than adequately recognised elsewhere. The theme of the course, and the form and content of most of the separate units were, I know, subjected to thorough scrutiny by the Course Team. But in the event, the growth concept seems to have eluded them, escaping perhaps through the holes in the 'topical' net, and the frame within which the whole picture was built up, the back-of the-mind rubric for the writers, would perhaps have been more aptly entitled Personality and Learning in Childhood. But even so, as their essays on the self-concept demonstrated, it is difficult for the students to get a coherent synoptic view of personality at any point in its developmental history.

The Course Team adopted a self-denying ordinance that limited their view to the non-intellectual aspects of personality. This was no mere expedient restriction of content in a course which was to contribute only a half-credit to the student's ultimate degree. More seriously, it appears to have implied acceptance of what used to be regarded as a psychiatric rather than a psychological view of the structure of the personality from which intellectual characteristics, but particularly intelligence, are by definition excluded. However explicitly the particular psychologist may choose for a defined purpose to circumscribe his discussion, I find such a theoretical exclusion misleading to the student, unacceptable, and indeed, hardly possible to make. Even attitudes have their cognitive component, and it is hard to deal adequately with personality, much less with personality development, without explicit reference to cognitive process. But in practice the basic premiss is indeed quietly abandoned, or almost explicitly rejected in some of the course units. Williams in Unit 4 cannot discuss the structure of ' creativity ' without examining how it may be related to intelligence. Moseley (Unit 16) permits himself to talk about IQs and, in considering the tests that might be useful to the classroom teacher, accepts a range of attainment and other basically cognitive tests, while going so far as to conclude that " the case has not been made for classroom use of an introversion-extraversion questionnaire." Perhaps it was desirable to point up the fact that insufficient attention has been give to the non-intellectual aspects of personality in educational psychology, but perhaps the case for novelty has been over-stated. It may be forgivable that Sully and Sophie Bryant have been passed over, but in the record, what of Burt and even Terman (the *Genetic Studies*), and the many others, including some members of the Course Team, that they have influenced—albeit indirectly? Williams recognises Guilford's broader, more generous conception of intelligence, anticipated quite explicitly by Binet himself. Surely with that in mind, Cattell was right to include intelligence in his matrix alongside his orectic factors, as one more facet of personality, and that an important one.

In conclusion. Within the limits of a review it has been impossible to do even the justice of discussion to the great mass of material included within the published scope of E281. The fact that a university course has come forward at all for this kind of public appraisal is, like the course itself, a striking innovation. I have no doubt that it stands up well alike, in content, and breadth, technical sophistication and style of presentation. In that context two points must be made, emphatically and with confidence The Course Tutors and students within my range of contact are unanimous that the course has that inherent interest that was regarded by the late Rex Knight as the prime requirement of any beginning course in psychology. With a like unanimity, tutors and students agree that, even in its present form, and in terms of both work-load and intellectual demand, it is quite unsatisfactory that the course should not rate a full credit. I hope—indeed, suspect—that the Course Team, too, will agree, and that they may be able to introduce that rectification in 1976.

BOOK REVIEWS

Bracht, G. H., Hopkins, K. D., and Stanley, J. C. (Eds.) (1972). *Perspectives in Educational and Psychological Measurement.* Englewood Cliffs, N.J.: Prentice-Hall, Inc., pp. xvi+357, £2·80.

This book, intended as a reference work of latest developments, is a collection of articles reprinted from various US journals and conference reports, 1960-70. It is geared to school testing programmes, including guidance, although the many chapters on measurement and evaluation have more general application in psychology. Articles from Cronbach, Kuder, Anastasi, Jensen, and others are included in the 34 chapters.

A chapter by F. B. Womer describes a far-reaching educational project (National Assessment of Educational Progress) which it is hoped will provide information not currently available about the present educational picture in the US, with the eventual aim of improving the decision making of educationalists. The 10 areas of study are Art, Career and Occupational Development, Citizenship, Literature, Mathematics, Music, Reading, Science, Social Studies and Writing, with further areas to be developed. Each area is made up of 160 minutes of ' exercises,' thus named since they include skilled performance as well as multiple choice, and other items.

Except for children in institutions, the population comprises a school sample of all 9-year-olds, a school sample of all 13-year-olds, a school and household sample of all 17-year-olds, and a household sample of young adults aged 26-35. Geographic areas throughout the different states are sampled, and different types of community (large cities, suburbs, small town—rural). The three levels of difficulty to be considered are (*a*) what almost all (90 per cent) can do: for example, the reading skill of 9-year-olds; (*b*) what the typical (50 per cent) can do; (c) what the most able (10 per cent) can do.

It is emphasised that standardised testing is not the model for National Assessment. It is not aimed at classifying individuals, but at identifying the things that the defined groups of children and young people can do. The only criterion of validity of the ' exercises ' is content validity, and both lay and specialist judges are used in its evaluation. This project is described as the most elaborate attempt ever made to assess the ' outcomes ' of education, as there is believed to be no direct evidence of whether or not schools are doing a good job of meeting the needs of American society.

A. R. Jensen's chapter on ' The Nature of Intelligence ' is a reprint of his 1969 article in the *Harvard Educational Review* entitled ' How much can we boost IQ and scholastic achievement? ' His standpoint is in direct line from Spearman. For Jensen, g can be regarded as the nuclear operational definition of intelligence, the factor common to all tests of complex problem solving. The general factor is best thought of as a capacity for abstract reasoning and problem solving. He argues that intelligence, as he specifically defines it, fully meets the usual scientific criteria for being regarded as an aspect of objective reality, just as much as atoms, genes and electromagnetic fields, and that it is a ' biological reality.' Getting round the circularity of the normal distribution argument, he claims that IQs behave just about as much like an interval scale as measurements of height, so it is reasonable to treat the IQs as an interval scale. For Jensen, the best evidence lies in studies of the inheritance of intelligence. (He cites Cyril Burt's articles of the 1950s and 1960s) Further, he argues that, since the Binet-Simon scale arose from the problem of differentiating school children, its link with traditional systems of formal education, and the co-ordinated occupational structure, is all in accordance with societal demands. Our conception of the nature of intelligence and intelligence tests might have been quite different, he suggests, if the content and instructional techniques of education had themselves been different.

He argues further that intelligence has considerable relevance beyond the scholastic setting: " Whether we like it or not, the educational system is one of society's most powerful mechanisms for sorting out children to assume different roles in the occupational hierarchy." However, he does say that " where educators and society in general are most apt to go wrong is in failing fully to recognise and fully to utilise a broader spectrum of abilities than just that portion which psychologists have technically designated as intelligence."

To the present reviewer's astonishment, Jensen makes no reference at all to the work of Thurstone. He is indeed a very specific Spearmanite. For a student reader of this volume, Anastasi's sensible chapter on ' Culture-Fair Testing ' could profitably be read after Jensen's article.

The short section on ' Measuring Interests and Personality Traits ' is given three chapters only. Kuder's article based on his long experience in interest measurement is valuable. Jensen appears again with his Buros reviews of the Rorschach; he ends with the suggestion that " the rate of scientific progress in clinical psychology might well be measured by the speed and thoroughness with which it gets over the Rorschach."

The impact of testing and suggestions for improving test programmes form the last section, although elsewhere in the book concern with social consequences (Ebel), privacy, greater selectiveness in tests to suit the individual, and related topics, are given consideration.

By making accessible in one volume some of the most recent American statements in educational measurement, a very interesting perspective is given to the reader. The psychometric technology is importantly discussed (especially reliability and validity), and the general cognitive emphasis is understandable; but there are many topics left untouched. To leave the nature of intelligence to Jensen's quite specific view could be misleading to the unguided reader. Perhaps the National Assessment programme will open up much wider perspectives.

FLORENCE E. MACNEILL.

BROWN, D. W. F. (1972). *Putting Minds to Work.* Sydney: Wiley, Australia, pp. 270, n.p.

This introduction to modern pedagogy concentrates on the professional skill of planning lessons which the author describes as a process of anticipating the " . . . verbal contingencies to create a framework for the verbal exchanges necessary for mastery of the more complex ideas of a topic." He argues that a teacher with an intimate knowledge of his topic, with clear goals and a set of statements and questions that are likely to promote thinking on significant ideas of the topic, is more likely to be successful and able to cope with matters of personal relationships. Unlike so many other texts which express this sentiment, this one goes on to show how a teacher might set about achieving this happy state.

The book covers an extensive series of planning exercises which would give a trainee teacher experience of a splendid array of techniques were he to follow all the suggestions. Perhaps one should not recommend this volume to a teacher who is not confident of his own abilities to learn, for he will surely shy away from the rigorous analytical approach with its acknowledged borrowings from programmed instruction and other tough-minded disciplines of lesson preparation. But for the teacher intent on developing genuine professional competence in the art of building up the mental powers of the pupil, this approach will repay careful study. The style and layout of the book will probably help those readers who can accept the use of ruled off panels and summaries concentrated into tabular form. As an interesting contrast, the transcripts of lesson fragments make amusing reading if one can suppress the underlying horror at what is by no means an unusual display of conversational mismanagement.

Discrimination and generalisation are given particularly thorough attention both at the analytical stages and in the conduct of classroom activities. Many clear examples are given so there is really no need to dismiss this book on account of its rather formidable headings such as 'Prestructuring the Framework of Verbal Transactions.'

A proper preparation for the highly technical job of putting minds to work is bound to involve non-trivial technique. The brain of the pupil is no less powerful than that of the teacher. If the teacher expects to transmit and communicate much more than he receives then he should prepare himself with whatever technique he can muster. He is not really clever enough to invent as he goes along. Let us hope that he will be able to lay hands on such a book as this and get time to absorb it.

B. DODD.

CHAZAN, M., LAING, A., and JACKSON, S. (1971). *Just Before School.* Oxford: Basil Blackwell, pp. 220, £1·60.

This first research report of the Schools Council Research and Development Project in Compensatory Education, based in the Department of Education of the University of Swansea, deals, as the name suggests, with children who are just 2–3 months away from school entry. As the preface informs us, the main research project, concerned with children of infant school age in selected areas in both England and Wales, has three main aims:

(1) To provide screening techniques so that children in need of compensatory education may be identified as soon as possible after school entry.
(2) To make longitudinal studies of infant school children in deprived areas, with particular reference to their response to schooling and their emotional development.
(3) To develop teaching programmes, involving materials in a variety of media, which may be used to help culturally deprived children at the infant school stage.

Although this study is related particularly to the second of these aims, it is based on a selected group of children *before* they entered the schools associated with the infant school investigation in one area in Wales, and is therefore presented separately from the report of the main project.

The first two pages—an excellent foreword by Lady Plowden—set the tone for an eminently readable, lucid and, dare I say it, sensible study of the complex problem of deprivation. The authors show a refreshing awareness of the difficulties inherent in such a study and have tackled it from a variety of angles hitherto relatively unexplored. They are also to be congratulated on their examination of the literature in this field. The bibliography itself is worthy of special mention.

The 122 children, who provide the study sample, all live in Swansea, 'the ugly lovely town of Dylan Thomas.' Half the number live in an area designated as 'deprived' and half in a control area where the population is described as 'settled working class and middle class.' As in the Newson study, a questionnaire approach is used to obtain information about the children from their mothers. Two questionnaires, taking one hour each to complete, were administered by four interviewers and the number of questions asked—143 and 148 respectively, giving in all 360 items of information about each child—is an indication of just how thorough the investigation is.

The first questionnaire, designed to elicit factual data on each child's developmental history, parents' educational background, family composition, level of income and amenities of the home, also has a number of scales aimed at identifying emotional and behavioural problems in the child. The second questionnaire is concerned with the provision in the home of educative experiences, such as play materials, opportunities for play, use of television, radio and record players, parent and child's interest in reading and the degree of contact which has been made with the school which the child will shortly be attending. It includes, too, a brief section on the child's speech patterns and records the use made by the family of outside agencies in time of difficulty.

Analysis of this enormous bank of information is made under three headings—the children and their background, preparation for school (in terms of experiences provided before entry to school), and behaviour problems. Throughout, comparison is made between the findings for the deprived area group and the control area group, but, in addition, the sections on preparation for school and behaviour problems cut across these area divisions to study more closely in the one case, children rated well prepared *versus* children rated poorly prepared, and in the other, children showing many problems *versus* children showing few problems.

In conclusion, the authors have some worthwhile suggestions to make on ways in which the development of pre-school children, particularly those living in restricted environments, can be helped.

Just Before School is a book which has much to offer to all those concerned with the education of young children.

ELIZABETH H. B. MITCHELL.

DINNAGE, R. (1972). *The Handicapped Child: Research Review Vol. II.* London: Longman/The National Children's Bureau, pp. 451, £3·30.

This is the second volume to appear of a proposed three-volume review of research on the handicapped child. The first volume (Dinnage, 1970) dealt with neurological disorders. This volume surveys the literature published in the last 12 years on disorders of vision, hearing and speech, with a shorter section on physical handicaps.

There are four major sections in the book. The first is a 65-page review of the literature. Mrs. Dinnage tackles successfully the problems of integrating contributions from many disciplines and of organising, within a logical framework, material on categories of handicap which frequently overlap. A wide range of journals has been searched (in French and German as well as English) although material which is purely medical has been excluded. The result is a survey which is always clear and precise, critical—especially of the *lack* of research in some areas, notably on the visually handicapped—yet constructive in suggesting where lines of research could be more fully developed.

The second section (189 pages) provides abstracts of the key publications discussed in the review. These are presented in five groups according to handicap, but are arranged according to date of publication within these groups. This is a particularly valuable section as many of the papers come from sources not readily available to psychologists. Unfortunately, no indication is given in the review that a book or paper under discussion appears in abstract. The third section is an annotated bibliography of references for which abstracts are not provided. Finally, there is a composite bibliography directing the reader to the appropriate abstract or annotation (but not to the review), and a subject index.

The arrangement of the material means that the subject matter can be approached through individual publications (by way of the composite index) or through topics (by way of the review section). It is a book both for the library and for the serious student of the handicapped. We can look forward to the third volume on mental handicap and to the completion and publication of some of the ongoing researches reported in the text.

RONALD FYFE.

DOUGHTY, P., *et al.* (1972) *Exploring Language.* London: Edward Arnold, pp. 191, 90p.

Although this book was written in conjunction with *Language in Use* as part of a Schools Council Programme for teachers of English, it is obviously not only intended as a companion volume but also as a book in its own right. Three authors share the task of attempting to give the reader a fuller understanding of language in use.

Peter Doughty introduces the book by trying to convey that we all acquire attitudes to language, whether spoken or written, together with ideas about it and value systems related to its use. His presentation is unhappily marred by an over-abstruse style and an unnecessary and ugly use of *language* as a verb and *folk-linguistic* as a noun, a use which is shared by the other authors.

Geoffrey Thornton writes more clearly about early language experience but his discussion of differences between families is entirely hypothetical, for no reference is made to any systematic observation; and, indeed, in the present state of research into children's experience of language comparatively little can be found. There are many assumptions about home life in the literature, often based on casual observation of mothers and children in the presence of professional people, or in public where discipline requirements influence conversation. Inferences are sometimes made from observations of differences between children in schools, but neither source of evidence is particularly reliable, and it is questionable whether generalisation into home settings is even valid. Indeed, this point seems to have been missed by Thornton although a major theme of the book is that various forms of language may appropriately be used in different social contexts. Thornton's discussion is important, however, in that it leads into Doughty's recommendation in a following chapter that teachers should not assume children to be 'without language' if they find the language and methods of school unfamiliar, and this is highly relevant to discussions of deprivation in the pre-school years.

Although much is said on this topic we simply do not know how much experience in different situations is needed to establish a firm basis for learning a language. One suspects from more recent work that the roots of many of the young school child's problems in demonstrating his skills lie not in his earlier experience but in his unfamiliarity with the tasks and the language of school, uncertainty or incorrect assumptions about what is required, and apprehension lest differences between his speech and the teacher's should lead him to feel stupid or foolish. If, as Doughty claims, children come to school equipped with different biases in the use of language, rather than developed and undeveloped abilities, then the concept of compensatory education is called in question, for appropriate treatment on entering school would be required rather than early compensatory teaching. When, on the other hand, children are badly retarded by physical, emotional or social deficiencies that undermine their constitution and impair their functioning then undoubtedly they are in need of special help. But, if they have already shown that they find learning difficult surely they require special treatment, leading to adequate physical and emotional care as a basis for learning, rather than compensatory education?

In a chapter entitled 'Command of a Language,' Doughty, discussing knowledge of language as distinct from knowledge about its use, introduces notions of innate competence and genetically programmed mental processes without an adequate clarification of their meaning. This may leave the unwitting reader with a strong impression that individual children's language abilities are less susceptible to informal and formal educational influences than is likely to be the case. Moreover, a view of a child as a passive recipient of genetic and environmental guidance does not really square with the reality of the child as an active constructor of his own forms and styles of speech. It would be a pity, too, if the impression that language ability and general cognitive skill are independent faculties were conveyed, for the use of meaningful and more complex forms of speech leans very heavily on advances in cognitive skill.

The best part of the book is written by John Pearce, who discusses clearly the actual variety in spoken and written English. He is not afraid to use technical terms to non-linguists but he does so sparingly and to good effect, making use of illustration rather than abstract definition. This part of the book is most likely to be helpful to teachers. The rest could have been written more briefly and clearly to achieve the authors' aims more effectively.

HAZEL FRANCIS.

GARDNER, W. I. (1972). *Behaviour Modification in Mental Retardation.* London: University of London Press, pp. 379, £5·60.

In the current proliferation of texts dealing with the application of learning theory to disturbed and abnormal behaviour, this attempt to detail the use of largely operant conditioning principles in remedial work with the mentally subnormal will be much sought after by clinical and educational psychologists whose often thankless task it is to attempt to enlarge the personal, social and occupational skills of such persons. It is likely, however, that the American and British reader will view the book rather differently. For the former, some of the matter and much of the manner has an almost polemical tone—as much concerned with expressing a philosophy of 'behaviourally' *versus* 'dynamically' oriented treatments as with outlining the principles and practices of the first named. For the latter, however, already schooled in the ways of Watson, Eysenck and Skinner, much of the fairly basic material of Chapters 4, 5, 6 and 7, dealing with the 'Nature of Behaviour Modification,' 'Concepts of Respondent Learning,' 'Operant Learning' and 'Observational Learning' will be already thoroughly built in to their professional repertoire and, but for the newer and largely good and relevant references to applications in the field of mental retardation, they will not necessarily find Professor Gardner's exposition of these any better than many other contemporary textbooks on learning theory.

These chapters follow an introductory section which deals with the types of problem behaviours which the mentally retarded subject is likely to present and are followed in turn by a section on the psychological evaluation of the mentally retarded client. The latter expresses a functional analysis approach to the client's behaviour with which this reviewer has great sympathy and which is clearly consonant with the contemporary philosophy of assessment, in this country at least, which considers that assessment must be prescriptive and not simply descriptive. It must result in data which direct rehabilitation activities and decisions. Gardner clearly leans heavily on Ferster's (1965) view that " . . . a functional analysis of behaviour has the advantage that it specifies the cause of behaviour in the form of explicit environmental events which can be objectively identified and which are potentially manipulable . . . Given an individual for whom money, social approval, control of other individuals, and various forms of contact are reinforcing events, the environment available to the individual has a vast potential for selectively reinforcing those performances that would be effective in producing the reinforcing consequences."

The real meat of the book comes in Part IV in which the final five chapters (including a most interesting and detailed, though rather apparatus dominated, final chapter on technique by Screven, Straka and La Fond) are given over to methods of producing behaviour change in both the moderately and profoundly retarded. These methods, largely operant, are fully explored and it soon becomes clear that although the principles are well established the difficulties of applying these scrupulously do not suggest that herein lies a panacea for mental retardation. Indeed the difficulties of application sometimes seem overweeningly great, especially on the question of establishing appropriate reinforcers consistent over time and over persons. There are occasions when the author's 'environmentalist' orientation seems to blind him to the analysis of intra-individual parameters and to make him reluctant to explain phenomena in terms of these. For example, Gardner says on

p. 91, " Stimulus events which are reinforcing for one person may not be reinforcing for another " . . . " the range of positive reinforcing events is greatly limited for many retarded adolescents and adults and at times can be quite idiosyncratic " . . . " The reinforcing properties of a given stimulus event may be high on one occasion and low or absent on another." Later, on p. 101, he says "A related variable is that of the kind of reinforcer. Approval, praise and other social stimulus events may be quite powerful for some but relatively uninfluential for others." One wonders why ?

The crucial statement made by this book is that " much of the behaviour limitations present in the retarded appear to be due to the inconsistent, inappropriate and infrequent nature of reinforcing events provided by the environment." This theme is pursued with reference to a wide though not wholly comprehensive section of the largely American literature. This reviewer would have wished a rather more critical appraisal of some of the work quoted, e.g., that of Burchard and of Lent, and the author's style is somewhat turgid and verbose especially in the earlier chapters. To have a name like Gardner, the author tends too often to call a spade a bi-manual humus agitating facility, although on the whole in his general writing technique he does practise what he preaches—reinforcing, exemplifying and recapitulating to the point of being repetitious. His method is at work in the book and this is as it should be since the book is essentially methodological rather than theoretical Indeed, there are chinks in Gardner's theoretical armour over and above those already quoted, especially when he allows himself the luxury of accepting, with Bandura, that in modelling the acquisition of new responses will depend on the " capacity for representational remediation and covert rehearsal " (p. 135), something suspiciously like the kind of concept he is berating so vigorously when these concepts are proposed by the dynamic psychologists.

In spite of these criticisms the book is nevertheless an important one and there is so much of real substance, especially in the second half, that this reviewer, a practising behaviour therapist in mental retardation, will have frequent recourse to it for points both of principle and of practice. Clinical psychologists, educational psychologists, and possibly some teachers who are concerned with remedial teaching and social learning in the subnormal, will find this a valuable text which is well produced (only seven or eight misprints) and which reads much better the second time. It is worth that at least.

D. F. CLARK.

GARRISON, K. C., and MAGOON, R. A. (1972). *Educational Psychology: An Integration of Psychology and Educational Practices*. Columbus : Charles E. Merrill, pp. 720, £5·50.

It is not in every subject index that ' saccadic movements ' lead to Saint Augustine and ' lower class ' to Loyola. The saints, although apparently deprived by their antiquity of author status, make brief textual appearances in the course of a 16-page review of ' theories or models of teaching.' Nor can the daunting ideals of the 1938 *Statement of Objectives for American Schools* (" The educated person works to improve the health of the community . . . is participant and spectator in many sports and other pastimes," etc.) have an airing in many contemporary works on psychology.

Richness, indeed. But what of the integrative power which the title might lead us to expect ? The authors are not, alas, pattern-makers. They offer the reader a bewildering variety of other men's classificatory systems, but rarely their own syntheses. Instead they profess a platitudinous eclecticism : " Generally, it is fallacious to think that there is one method or recipe which will be equally effective under all conditions and for all problems " (p. 193).

The topic of school learning is fully treated. An old tradition of dubious value is followed in devoting a separate chapter to retention and transfer, and the early placing of this chapter might also be called in question. Gagné's typology is deemed 'useful' (p. 305) without the *caveat* that his 'types' of learning rarely, if ever, occur in isolation. Linkages between specific components of learning theory and educational practice are inadequate: thus, the discussion of attitude formation in Chapter 13 includes no clear reference to classical conditioning theory, which has been outlined in Chapters 6 and 10.

British readers may accept with gloomy resignation the attribution of a hierarchical theory of abilities to the Thurstones (p. 84) and the omission of any reference to M. D. Vernon's contributions in the review of perception. Berlyne's name is also absent from this latter section, which is generally unsatisfactory, and completely divorced from the later discussion of audio-visual aids.

The treatment of social psychology is disappointing: Lippitt and White are ritually resurrected, but Fiedler and Argyle are ignored, despite the obvious educational relevance of their work. Little attention is given to teacher-teacher, teacher-administrator or teacher-parent relationships.

The chapter on 'Research and Quantitative Methods' could have been more useful if the authors, following the lead of Sarbin and Coe, had concentrated on the needs of the new reader of research papers: instead they have produced the usual pot-pourri of inadequately illustrated statistical theory. The chapters on 'Standardised Tests' and 'Measurement and Evaluation in the Classroom' have little value for British students, although readers may be interested to note the uncritical citation of the Tutter inventory (p. 555).

In all, this is a book for the teacher or advanced student, rather than the beginner, who might derive from it a poor opinion of the rigour and practical relevance of educational psychology.

E. MARGARET MOORE.

GOLDSTEIN, A. P., and KRASNER, L. (Eds.) (1972). *College and Student*. New York: Pergamon, pp. 471, £7·00.

This collection of readings in the social psychology of higher education demonstrates the strengths and weaknesses of educational research in the USA. The quantity is impressive. Each author is aware of previous research. Empirical techniques are thorough and rigorous. The classification of topics facilitates clear analysis. Researchers take the problems of social change seriously and can predict expansion rates and cost them. Yet the 'computer experts, the technical planners, and the budgetary wizards' (p. 446) are not regarded as pre-eminent. In the final part of the volume lip service is paid to the recommendations set out on the need to improve the quality of education So far so good. But the collection of 32 articles is repetitive and parochial. The bibliography is extensive but the entries are almost exclusively American. More serious is the absence of conceptual analysis. Items in the questionnaires used show a largely uncritical acceptance of American assumptions and policies on higher education. Consequently, careful though the research is, it does not throw much light on desirable qualitative changes.

For example, in part two, the expectations of students entering college are studied. The results indicate that the freshman year is one of frustration, the second year one of dissatisfaction and the fourth year one in which undergraduates begin to disengage from college life in preparing to leave for a career or graduate work. Only the third year is one in which students as a group come together. Expectations and degrees of subsequent fulfilment are influenced by the school and socio-economic backgrounds of students. We are left uncertain about what kinds of expectations colleges should meet in order to improve the quality of higher education.

The research studies in part three show that students, in general, become less dogmatic, less prejudiced and less authoritarian as they pass through college. Politically they become more 'liberal.' They value aesthetic experiences more highly and become more aware of the contemporary world. Evidence of increased intellectual capacities and interests is less consistent But should higher education teach a large proportion of the young generation to reject the *status quo* ? Or should universities and colleges restrict their aims to the development of critical and enquiring intellectuals prepared to pursue the search for knowledge wherever it may lead ?

Institutions, of course, differ and articles in part four classify and compare college environments in order to assess their impact on students. In one study 33 institutional variables were analysed (p. 164) and then boiled down to differences in terms of wealth, size, private or public, male or female, technical-vocational emphasis and homogeneity of environment. These researches show how varied colleges are but do not enable student-college relationships to be studied in depth. What kinds of institutions of higher learning will best suit the needs of the next generation of students ?

Part five deals with the impact on students of formal organisations such as the departments to which they belong, where they live and the clubs they join. In the USA members of fraternities and sororities are likely to be more sociable, politically and economically more conservative, more authoritarian and less intellectual than students in other residences. Students tend to move into education, business and social service courses and out of engineering, medicine, dentistry and the physical sciences. The issues are social and economic. Should colleges promote conservatism or radicalism ? Should they provide a 'liberal' education for the 'whole man' or meet professional manpower needs ?

Finally, part six contains interesting accounts of the student's interpersonal relationships with fellow students and teachers. Student unrest and generational conflict are examined in the light of university variables (its goals, faculty autonomy and freedom), social variables (urbanisation, family background), and psychological variables (alienation, apathy, aggression). The patterns are becoming more and more confused Yet it is possible to predict that in the 1980s students will be very much the same as ever except that they will be 'post-modern' and 'activistic' in their life styles (p. 340). The universe of students will expand bringing greater diversity and, in general, " the more incongruent a student is with the overall environment of his college, the more likely he is to withdraw from that college or from higher education in general " (ibid).

The conclusion is clear and obvious. If colleges and universities expand a diversified range of students will find much that is irrelevant Some of them will drop out, some will revolt. What should universities and colleges do to avoid wastage and unrest ? Americans are inclined to try to adapt their institutions to individuals and partially succeed. But should the universities be transformed to cater for the social and vocational needs of the vast majority of young adults ? European answers may be different. A comparative element would vastly strengthen this volume of research. As it is, it does not offer the kind of evidence which will force those concerned on both sides of the Atlantic with the future of higher education to reconsider some basic assumptions. This is a weakness in an otherwise sound, scholarly and informative book.

B. HOLMES.

HEINE, P. J. (1972). *Personality and Social Theory*. London: Allen Lane., Penguin Press, pp. 204, £3·00.

This book was published in 1971 by the Aldine Publishing Co., USA, and is now issued here by the Penguin Press. The author is a sociologist and anthropologist with degrees from three American universities.

After an introduction which is perhaps the best part of the book, Mrs. Heine goes on to discuss the 'problem of personality' under three headings: individuality, roles and change. Though the first main section is called 'Individuality,' it deals mainly with early social psychology—the crowd, the group mind—and experimental social psychology. The conclusion Mrs. Heine draws from her very brief survey seems to be that social psychologists took a wrong turning quite early, ended up with unprofitable attempts to analyse social interactions between persons artificially brought together in groups, and lost sight of the people who were in the groups.

In the section on roles, Mrs. Heine returns to the theme of the introduction and discusses psychologists' attempts to describe and measure character and personality and to cope with the uniqueness of individuals. The conclusion seems to be similar to that drawn from the survey of social psychology: that psychologists, too, lost the person and ended up with a set of trait or attitude scores which tell us nothing about how an individual will behave. Sociologists also became interested in 'personality' and developed role theory to account for the way people's behaviour varied with the social setting in which they were acting. But the content of roles seems not to have been analysed, Mrs. Heine says, nor is it clear how the role-appropriate behaviour may be learned. Some role theorists seem to suggest that a person takes on particular roles because he is that kind of person, thus making personality an undercover agent as it were; others suggest that, like Beerbohm's Happy Hypocrite, one becomes the kind of person that the role requires The latest development in terms of the games people play in their dealings with others (Berne) or of the 'presentation of self' (Goffman), Mrs. Heine finds uncongenial, and dead-ends for role theory. The last short section of the book is called 'Change.' Here Mrs. Heine discusses the difficulties that sociologists have in accounting for social changes.

It is not clear what Mrs. Heine was aiming at when she wrote this book. In spite of what is said in the foreword (by Ralph W. Heine), and on the dust jacket, Mrs. Heine has not resolved the problem she set herself, nor perhaps even have decided what that problem was. Perhaps the question was how can sociologists understand and/or explain people as individuals in a socio-cultural setting without losing the person in all his complexity and uniqueness. In the introduction Mrs. Heine points out the contradiction between our present emphasis on the importance of the individual and the rapidly increasing numbers of people, especially in technological societies which themselves reduce the importance of any one person. This is by far the most interesting and promising part of the book, but the promises are not fulfilled. One gets the impression that the author, as sociologist, has been thrown off balance by the discovery of people in all their diversity, complexity and obstinate refusal to be completely moulded by their socio-cultural environment.

Even at the end of the review, the reviewer cannot decide whether or not this book is worth studying in detail. Perhaps it should be read by undergraduates specialising in sociology or in psychology, not so much for the detailed criticisms of sociological or psychological theories it contains, which are, however, not fully developed, as for the feeling that comes across that here is an author struggling to reconcile sociological theory and the real people that she knows The reviewer would recommend it more readily for general reading if it were available in the cheaper paperback Penguin form.

AGNES CRAWFORD.

MILLER, A. G. (Ed.) (1972). *The Social Psychology of Psychological Research*. London: Collier-Macmillan, pp. 533, £3·25.

This book is concerned with the ways in which experimenter and subject, both human, may react to one another and the effects these interactions may have on the data collected. It consists of 25 chapters, reproductions mainly of articles which appeared between 1962 and 1970. Slightly over 50 per cent belong to the period 1967-68. Reproductions from the *Psychological Bulletin* and the *Journal of Personality and Social Psychology* account for eleven chapters. These twenty-five chapters are allocated, in approximately equal numbers, to five sections, to each of which Professor Miller adds an introductory chapter designed to place the various articles in perspective.

Section I questions the wisdom of experimenter dealing with subjects in an impersonal, objective fashion. It is argued that, under these circumstances, subjects may withhold relevant information, or even attempt to mislead the experimenter by word or deed. " We can no longer afford to divert nice, tender-hearted humanitarians into clinical work and leave the research for hard-nosed, hard-hearted, impersonal folk " (p. 23). " It seems imperative that psychology adopt a more realistic image of the human subject " (p. 45).

Section II presents and examines Stanley Milgram's research on obedience. That work is criticised on methodological and on ethical grounds. Martin T. Orne and Charles H. Holland argue that the subjects did not perceive the experimental situation as Milgram intended, claiming that most of them simply saw it as a harmless experiment and did not believe that they were shocking anyone. On the ethical issues, we find Diana Baumrind asserting that " the subject has the right to expect that the psychologist with whom he is interacting has some concern for his welfare, and the personal attributes and professional skill to express his goodwill effectively " (pp. 107-108).

Section III examines the problems of using deception in experiments and the related problems of debriefing. Herbert C. Kelman advocates rôle-playing as an alternative to deception while Jonathan Freedman argues that any form of 'let's pretend' will not yield generalisable data. Donald T. Campbell is quoted as saying that debriefing in deception experiments is " many times more of a comfort to the experimenter . . . than to the respondent who may learn, in the process, of his own gullibility, conformity, cruelty or bias " (p. 159).

Section IV is concerned with the effects on the data obtained of the thoughts, feelings and expectations of the subjects. The argument is that a subject cannot help trying to figure out what the experiment is about with the result that he attempts, for example, to supply ' good ' data, i e., of the kind he expects the experimenter to wish for. Also, in the classical conditioning experiment, the subject may respond to the bell as meaning ' shock follows ' and for that reason take evasive action.

The final section deals with the ways in which the experimenter's expectations may influence the data. This section concludes with a chapter by Robert Rosenthal and Lenore Jacobson entitled: ' Self-fulfilling Prophecies in the Classroom: Teachers' Expectations as Unintended Determinants of Pupils' Intellectual Competence '. Change in IQ was the criterion used in that study One would have thought that the point could have been made much more clearly had scholastic performance been the criterion.

The basic theme of this book is that human beings think, feel and desire, and that these processes may and do influence their behaviour. It may seem odd that such a book is necessary, but some psychologists have been remarkably foolish in their professional capacity. While it is possible to appreciate and tolerate one or two sermons on prodigal psychologists, this book contains too many on that theme. Though competent, and probably useful for seminars, it is too repetitious for normal reading from cover to cover.

HENRY H. FERGUSON.

NAIDOO, S. (1972). *Specific Dyslexia.* London: Pitman Publishing, pp. 165, £3·00.

This book has an explanatory subtitle, "Research report of the Invalid Children's Aid Association Word Blind Centre for Dyslexic Children," so one should not be surprised that it reads like a research thesis rather than a general textbook on the subject. This extensive study was carried out over a two-year period. The subjects were some 98 boys, all of at least average intelligence, with severe reading and/or spelling problems, where these latter could not be attributed to emotional or educational factors, or to neurological or physical factors.

For each of their subjects Mrs. Naidoo and her colleagues collected detailed data relating to developmental history, pre-natal history, family and school history, whilst a doctor examined each boy to check his physical and neurological status. At the Centre each child underwent an extensive battery of tests covering such areas as general intelligence (the WISC), speech and language functioning, laterality, right/left discrimination, motor control, etc. Thus were included all the important areas of functioning which have been implicated in previous studies on dyslexic children, but this study has provided the unique opportunity of considering all these factors on the same population.

The results of the dyslexic children (considered in two groups of reading retardates and spelling retardates) were compared to those of control boys carefully matched for age and socio-economic background. Herein lies the one criticism of the book, for the group of reading retardates were found to be of significantly lower general intelligence than their controls, but this factor was *not* allowed for when making subsequent comparisons of more specific areas of intellectual functioning. Thus, perhaps more significant relationships were reported for the reading retardates than would otherwise be justified, but since the results are so fully reported one can largely re-interpret the data as required.

Interest in specific dyslexia has grown rapidly in the last few years and this study provides a very good, solid and much needed groundwork of factual information on which future studies and theories can be based. The theoretical discussions contained in this present book are not so compelling, but, nonetheless, some very interesting possibilities are suggested and certainly the positive results obtained will add a few more nails to the coffin of those who refuse to acknowledge the existence of 'specific dyslexia.'

E. K. WARRINGTON.

PETRIE, C. (1972). *Backward and Maladjusted Children in Secondary Schools.* London: Ward Lock Educational, pp. 128, £2·00.

The title of this book belies the contents: it is not a penetrating treatise on backward and maladjusted children, but a description of the personal experiences and approaches of the author when working with 16 withdrawn, disturbed or hostile children who made up a special class. However, Mrs. Petrie, a Scottish psychologist, in quoting the case histories of these social and educational casualties, is able to describe the symptoms of backwardness and maladjustment and discuss the interaction of economic, environmental, social, intellectual and emotional factors which have precipitated their educational failure. She examines the varied causes for their alienation from a system which they cannot understand, to which they are unable to conform, and which is shown to have failed to meet their developmental needs. Indeed, Mrs. Petrie is in no doubt that the schools have caused their maladjustment and incapacity to learn. She is not afraid to beat the drum occasionally and challenge the value assumptions that lie behind much of our work in schools.

Mrs. Petrie offers no panacea, except that of an honest, unqualified friendship and a respect for the humanity and integrity of the children, followed by a tailoring of the teaching to meet individual requirements in learning. Indeed, we learn that "Empathy and time are the important tools, for pupil and teacher" (p. 76). Readers will not find a compendium of new techniques for dealing with 'difficult' children nor guide lines for making relationships with them—but they will learn of the buffetings and pain meted out by children who strike back at the teacher who offers help yet represents the system which is doing them harm. There are some harrowing descriptions of what happens in the name of schooling to children who do not accept a school's assumptions or fulfil its expectations.

The book makes fascinating reading for all concerned with teaching children who present special learning problems in school. Through case-material it will help new teachers gain valuable insight into the problems of these children and their teachers. It contains much to stimulate and provoke experienced teachers and it is deeply, though sometimes unfairly, critical of the past and present thinking in practice. It will, however, tend to reinforce arguments put forward by those overcome with gloom about the prospects of these groups of children.

Although the work with children is described in fascinating detail, the ideas put forward by Mrs. Petrie cannot be systematically worked through and their limitations in practice explored. It is a pity since all of the topics discussed are relevant—none more so than the place of creative activity in the education of these children.

ALAN GORTON.

ROBINSON, J. O. (1972). *The Psychology of Visual Illusion.* London: Hutchinson University Library, pp. 288, c. £3·00, *p.* £1·75.

Visual illusions have been studied enthusiastically by psychologists over the last hundred years, but over this period there have been surprisingly few advances in knowledge, apart from an increase in the variety of illusion figures and in the number of speculative theories attempting to explain the effects.

The absence of an adequate reference book in English on the subject has been one of the many reasons for the slow progress of research, and has certainly led to the unnecessary duplication of many of the early experiments. Dr. Robinson's book now admirably fills this gap. He concentrates on the geometrical optical illusions, and provides a remarkably comprehensive collection of the many varieties of these figures with the original reference for each one, and a clear account of the rival theories for this type of illusion. He also includes a good discussion of figural after-effects, simultaneous and successive contrast, illusions of depth and movement, and illusions resulting from movement.

The discussion of the various theories of the geometrical optical illusions is one of the most valuable parts of the book. Unlike many other writers on the topic, Dr Robinson is not expounding any one theory and is therefore able to give a well-balanced critical comparison of all the different theories. He demonstrates quite clearly that none are by themselves adequate to account for all the observed phenomena, and that many of the theories are, in fact, based on underlying principles that are either completely hypothetical or at least not well-founded.

Perhaps Dr. Robinson has been more than fair to some of the theories. For example, theories suggesting that perceptual distortions are due to retinal mechanisms seem to be ruled out by the fact that the illusions are still seen when different parts of the figure are presented to different eyes. This was first shown over a hundred years ago, not just in the more recent studies mentioned in the book. Theories based on general principles such as potential fields or adaptation level seem very inadequate unless some assumptions are made about the details of the mechanisms by which these principles are embodied.

One of the most hopeful approaches to a theory of illusions may well arise from studying the adaptation and mutual inhibition of the neural analysers in the visual system which respond to orientation and spatial frequency. This idea is mentioned briefly, and it would be valuable to see it expanded. However, one of the main benefits of this book may be to encourage research to spread into new directions such as these instead of treading the well-worn paths yet again.

ANDREW GREGORY.

ROBINSON, W. P., and RACKSTRAW, S. J. (1972). *A Question of Answers.* London and Boston: Routledge and Kegan Paul, pp. 345 (2 vols), £5·50.

These volumes form the fifth title in the ' Primary Socialisation, Language and Education ' series emanating from the London University Sociological Research Unit, directed by Basil Bernstein, and will probably prove to be the most important works in the series. The implication of their findings for current educational practice is immense. When the work was begun in 1964, the Unit's sociological framework was fairly complete—elaborated and restricted codes had been defined and their users delineated. In particular, Bernstein (1961) had suggested that there were social class differences in child-rearing attitudes and behaviour which should lead to differences in children's speech. This hypothesis was meshed with the work of Cook (1971) and Bernstein and Brandis (1970) on the self-reported behaviour of mothers, and that of Hess and Shipman (1967) on the observed linguistic interaction of mothers and children, to suggest to the authors that a study of the answers of mothers to their children's questions, together with an analysis of the answers of the children themselves, should provide an insight into the means whereby the socialising agency of the mother provides an opportunity for the transmission of the restricted code. In view of the child's dependence on questioning as a means of gathering information this study would have wide implications.

The first problem the authors faced in mounting the study was that of devising a scheme for analysing the data obtained. Two early chapters are, therefore, devoted to an exhaustive analysis of the linguistic features of questions and answers ; this leads to the expounding of the complicated system devised for analysing answers by mode, form and context. Two of the following chapters covering the application of this taxonomy to (*a*) 'Answers of 5-year-old children to ' wh ' questions ' and (*b*) ' Reported answers of mothers to their children's questions ' have already been published. However, the scheme is also extended in the current volume to analysis of the answers of 7-year-old children to ' wh ' questions. All three analyses are carried out with painstaking accuracy and, despite the small samples, sufficient significant social class differences emerged to indicate that a promising avenue of research had been opened.

The authors then consider how these differences across context, mode, grammar and lexis came to exist and infer that the use of the restricted code by working class mothers is, in fact, to specify the form of the mother-child relationship rather than to teach the child. They relate this inference, then, to the answering behaviour observed in working-class children. The inference accords well with Bernsteinian theory and leads to several disturbing questions being posed about children's chances of benefiting from progressive, middle-class educational methods with their assumptions about the information-carrying role of the question-answer interchange. Volume II contains a correlational analysis of the answers of the 7-year-old children to examine the extent to which the use of the categories already defined co-varied across subjects (eliminating known sources of variance such as social class, intelligence, etc.) to provide a further vindication of the taxonomic scheme.

In view of the implications of these results for educational practice the authors apologise for the fact that their taxonomy is "embedded in a context of academic jargon and statistical analysis sufficiently web-like to render it relatively inaccessible to teachers." This is unfortunate. It is doubly unfortunate that not only teachers will find the work inaccessible—the general psychological reader will also have problems of decoding. The two volumes are monumental and form an important part of the neo-Bernstein edifice. However, the style is tortuous, the numerous caveats and cross references tend to obfuscate rather than clarify. This is definitely a technical work for the co-researcher—the lay psychologist will probably wish to wait for the promised 'later, simpler verison.'

HELEN QUIGLEY.

ROTHKOPF, E. Z., and JOHNSON, P. (Eds.) (1971). *Verbal Learning Research and the Technology of Written Instruction*. New York: Teachers' College Press, pp. 367, $12·50.

This book contains a selection of papers from a symposium of the same title which took place in 1966. The aim of the symposium was "to take stock of the more promising findings and concepts about verbal learning in order to see whether they had any practical implications that should be pursued." Also in the minds of the organisers was the hope that the publishing industry would adopt "technological approaches to the production of instructional materials." The contributors are American psychologists, rather than educationists, with strong theoretical interests in verbal learning, instruction, comprehension and readability.

Twelve papers are included, half of them followed by the comments of a discussant, making up quite a large book in all. The first three papers attempt to relate the learning of connected prose to paired associate or list learning Can instructional writing be reduced to simple standard associative units? The next three papers deal with measures of the (verbal) stimulus and characterisations of performance, including discussions of readability and comprehension. Then there are two papers which examine some aspects of the behaviour of the learner. The book ends with three miscellaneous papers concerned mostly with methodology, and for good measure there is a paper concerned with text-editing computer programmes for combining graphic and alphanumeric material, which on first impression seems to be totally irrelevant, but on reconsideration appears to be the contribution of a symposiast who took the 'Technology' of the title just to mean what it usually means, viz., *technology*, rather than *psychology*.

Many psychologists worry, as did the symposiasts, about the lack of contact between the classroom and the verbal-learning laboratory. Has anything been done to close it? In spite of their avowed practical aim the contributors fail to narrow this gap and their academic fundamentalism may even make it appear to be more alarmingly deep than ever before. No doubt it was a good symposium at which a number of like-minded psychologists very properly addressed each other, demonstrated their intellectual skills in dealing with problems of common interest, and provided mutual stimulation and encouragement for future research. But a good symposium does not guarantee a worthwhile book. In this case the book can be recommended only to those who have research interests in verbal learning, and they are likely by now to have found the contents of the papers published elsewhere.

R. L. REID.

ROGERS, C. R. (1971). *Encounter Groups.* London: Penguin, pp. viii+172, £1·95.

Much skill, money and energy has for a long time been devoted to the corporate training of people's physical and intellectual resources, but this is not true of their capacities for emotional sensitivity, social perceptivity, insight and *rapport*—unless you include the character-building properties of the public school rugby scrum. The British education system has tended to treat the idea that feelings might be ' educated ' as a provocative Flaubertian conceit in dubious gallic taste. But some of the opposition encountered by the various forms of group-meeting which Carl Rogers here discusses has been less temperate . where the Headmasters' Conference might suspect a certain un-British emotional indulgence and permissive decadence, the John Birch Society denounces (as Rogers illustrates, p. 12) a Communist plot—actually both Communist and Nazi !

The belief that a person can become more sensitive to other people's attitudes and emotions, more perceptive of his own nature and reactions, more spontaneous and secure in expressing his own feelings, more tolerant, less defensive, less hide-bound, more adventurous, more creative and generally more developed (' realised,' ' actualised ') as a person, as a result of ' encountering ' other like-minded people in a threat-free, supportive, accepting anything-goes atmosphere (and without the aid of a directive group-therapist), has been put into ever-widening practice since catching on in the early 1960s in California. Such groups vary in size, homogeneity of personnel, degree of structure, rules-of-the-game, specificity of immediate purpose and so on (Rogers mentions about a dozen examples), but they all share something of this belief, and the general aim of " the facilitation of the expression of both feelings and thoughts," whether they are primarily concerned with making better staff-managers, relieving drug-dependence or just generally helping people to ' grow ' as *people* The book discusses such ' growth ' or change, with respect to how individuals describe it introspectively, how it may be assessed objectively, to how to characterise it in terms of personality theory, and what socio-emotional conditions facilitate it. Almost all this discussion is in non-technical language.

The idea is,of course, that if you set up a group-climate of psychological safety, such that (contrary to everyday life) a member is not rejected, attacked, thought weak, silly or bad, etc., when he expresses in words or actions what he *really* feels, thinks, wants, likes, is afraid of, etc., you liberate the ' real ' person from behind the socially-reinforced *persona*, and allows him to see both what his true nature and potential is and that it is more acceptable than he had feared. In short, he " approaches a state where all is known and all accepted, and thus further growth becomes possible " (p. 11). (*Tout comprendre* . . . ; but the everyday world, indeed, does not forgive all.) And, from seeing others do the same, he learns to interpret other people's behaviour more sensitively and accurately. Thus he is educated in both insight and social perception.

Rogers produces his familiar session-transcript and self-report evidence to the effect that many participants do feel that they develop in these ways, describes the stages through which they pass to achieve this development and asks what are the qualities which enable someone to ' facilitate ' such development in others He also provides a chapter on research findings, in which he adds his personal comments to ten conclusions which Gibb felt entitled to draw from his 1970 review of some 200 empirical studies, and discusses an unpublished attempt to pin down, on a rating scale devised by himself, various sorts of change in patients undergoing group therapy.

Four interrelated assumptions behind this theory and practice of the liberating ' intensive group experience ' are worth noticing, since they are the source of some of the suspicions which traditional psychiatry has about it.

(1) It is assumed that the concealed self is, in some important sense, the ' real ' or ' true ' self. What is concealed is probably important (otherwise no point in concealing), but it is not necessarily any ' truer ' than what is revealed. My raw impulses are not any more true, and certainly not more human, than my civilised

behaviour; what is important is the quality of the adaptation by which I control or mobilise them. Hence, traditional attention to ego-defences, and the need for expertise in assessing them How does the group know when it has hit upon the 'true' nature and feelings behind my original 'mask'? It will accept as 'true' only that which the *mores* of the group hold to be valid, and which the sub-culture of the group consequently reinforces. But who is the custodian of the group's *mores*, and what is *his* authority? So far from being theory-free and non-authoritarian, the procedure is shackled to specific and naive beliefs about personality and mental health, the authority for which is not disclosed, and questioning of which authority is treated as a symptom of unregeneracy in the questioner. 'By their fruits,' however, it will be said, 'ye shall know them,' and all those people do feel better for the experience. Well, so do Sicilian peasants after confessing to their priest, but that tells you nothing about the truth of the priests' or the peasants' theories.

(2) It is assumed that to express in word or act *any* feelings that I have in this special context is necessarily a good thing, and is a sufficient condition of desirable 'growth.' No harm can come, surely, from seeing oneself more clearly, and from realising that others (even if only in an artificial context) can tolerate, accept and care for what they have seen. But to pressurise someone into acknowledging his true feelings is sometimes a frightening, demoralising action, because, even if others can feign 'acceptance,' he himself cannot This is why traditional therapists are at pains to assess ego-strength before interpreting defences. Mere exposure to consciousness does not resolve conflicts, as Freud early on discovered The therapeutic-developmental project is to reorganise the 'psychic economy' in such a way that previously repressed or preconscious material is drained of neurotic anxiety and brought under ego-control, this requires skill both in understanding the nature and origins of the anxiety, and in fostering ego-integration. To encourage, indeed demand, self-exposure in a permissively accepting milieu does not of itself improve ego-function, because it merely boosts morale in a regressive and dependent atmosphere, which is essentially unrealistic and therefore at odds with ego-function It is an old problem of psychotherapeutic technique to know how to wean the patient from his necessary temporary dependence on the therapist-as-ego to reliance on his own ego ('transference-resolution,' and Freud's fear that analysis might prove to be theoretically interminable). What then of the encounter-group's encouragement of defenceless, infantile and (one might say) parasitic dependence on the group-ego? How is *that* ego eventually assimilated or 'introjected,' so that the processed participant can generalise to the world of harsh reality whatever of good he has learned in the make-believe group?

(3) and (4) One of two assumptions must be made. Either that these jobs, of handling defences non-destructively and of integrating the exposed material into ego-function, require *no* particular expertise, or that the unselected participants possess such expertise as is necessary Rogers entertains both assumptions. Implicitly, by stressing the 'facilitation' of expression, communication and revelation, he writes at times as if he thought catharsis was all. Elsewhere he explicitly acknowledges that some participants attack others' defences and demand revelations in a merely destructive, sadistic and voyeurist way. But this is balanced by a touching faith that waves of intuitive therapeutic skill are dammed up in most members, awiting only the 'intensive group experience' to release them: there is a group-wisdom which, like the white blood corpuscles in the physical body, will intuitively eradicate harmful processes (p 44) Indeed, the untrained participant is often a better therapist, even for psychotic behaviour, than the psychiatric expert (p. 58). He is aware, however, that some people are thrown when they find (*mirabile dictu* !) that the world at large treats their new-found spontaneity and openness differently from the way the group did, and he realises that intense relationships conflicting with those of everyday life may develop in the group (pp 38-41). But these are regarded as failures of practice rather than challenges to underlying assumptions.

It is worthwhile winkling out some of these assumptions, because there are grounds, other than politico-hysterical, for not being overpersuaded by Rogers' chatty, avuncular, nice-guy advocacy of these practices, and for wanting to be clear in precisely what conditions, and for precisely what reasons, one can expect them to produce liberation rather than confusion (cf. Natale's recent NFER claim to be able to teach teachers to 'empathise'). There pervades his writing a suspicion of expertise, and a denigration of specialised knowledge as authoritarian, on the one hand, understandably ingratiates him with those whom Chomsky has called 'know-nothings,' and, on the other, must infuriate the John Birchers. Incidentally, for the next impression, in line 17 of p. 19, 'best' should presumably read 'worst.'

NEIL M. CHESHIRE.

RUTTER, M. (Ed.) (1971). *Infantile Autism: Concepts, Characteristics and Treatment.* Edinburgh: Churchill Livingstone, pp. 328, £3·50.

Professor Eisenberg, in his introduction to the three-day study group on infantile autism refers to John F. Kennedy, upon convening a dinner honouring American Nobel laureates in the White House, as saying that the home of American Presidents had never housed so much intelligence at one time since Thomas Jefferson dined alone. Excluding Leo Kanner, who first described the syndrome in 1943, the list of participants in the study group includes as impressive an assembly of experts on the subject as could be hoped for on a single occasion.

This book does not cover all that is known on autism, but it does inform the reader of much interesting research into the condition and brings him up to date with the developments which are taking place in concepts of this disorder. While the cause remains as much an enigma as it was a quarter century ago, and treatment remains elusive, there is evidence of an increasing measure of agreement on diagnosis, and the vitality of the research into the more precise nature of the deficits involved in order to aid educational planning offers hope to parents and teachers of the autistic child.

A study of the list of the research topics shows how the focus of interest has shifted in the past decade from the question of parental personality to identifying the physiologic and learning deficiencies. There is much discussion and research into the autistic child's perceptual and cognitive handicaps and into the precise nature of the deficits involved in his language impairment. There are comparative studies of the autistic child's difficulties with those of the non-psychotic brain-damaged child, the receptive and executive aphasic child and the partially blind and partially deaf child. There is also an interesting description of behavioural approaches in treatment.

For those involved in the education of autistic children, the report of the preliminary findings of an ongoing systematic investigation of the utility of special educational treatment of autistic children by Lawrence Bartak and Michael Rutter will, perhaps, be the most interesting section of the book. Dr. Schopler points out that autistic children have been exposed to a remarkable array of therapies during the past three decades. Early childhood autism is not a static condition. It changes with maturation and the evidence suggests also with education. In order to examine the effects of different types of special educational treatment of autistic children, three units were selected as representative of the differences of views in aetiology and on the nature of child development. The techniques used to study the effectiveness of the treatment in the three different units are fascinating in themselves as is the demonstration that teaching is an 'analyzable art.' The final outcome of the study will be awaited eagerly by those who are involved in educational planning for the autistic child.

The final section of the book is devoted to speech therapy with the autistic child and includes an interesting paper on the hearing behaviour of the autistic child as well as a description of treatment stressing the importance of the preverbal levels of understanding objects and situations.

The note of mild accomplishment on which the chairman ended the meeting seems more than justified by the quality and range of the research and discussion.

S. C. CUMMING.

SARASON, I. G. (1972). *Personality: An Objective Approach.* 2nd Edition. New York: Wiley, pp. 601, n.p.

In reviewing a second edition of a book there is the double task of analysing the book and comparing it with the first edition, especially if this is relatively recent as is the case with *Personality: An Objective Approach* first published in 1966.

Comparing the new book with the old edition the reader is struck by several important and worthwhile changes. The format of the new book is larger which allows a larger and better type and a clearer layout. Furthermore, there is a heavy addition of post-1966 references so that there is no doubt that the book is up to date, as well as new material on such trendy topics as humanistic and existential approaches to the self, for example.

Another curious addition, apparently an attempt to personalise the subject matter of the chapters, is a series of portraits of psychologists: is it a psychological rogues' gallery or a special form of the Szondi test? Actually these pictures are somewhat intrusive and carry no useful information whatever. Nevertheless, I think it fair to conclude the comparison by stating that this second edition is superior to the old although basically similar.

This book, according to the author, is intended explicitly for students who want to relate psychological knowledge to an understanding of the human condition (not, thankfully, the bestial). Thus the book must be judged against this aim. One highly useful quality of this book is its comprehensive coverage and its extensive index. A reader can usually find something about almost anything in psychology. Yet this strength is also its weakness. Thus, for example, if we look up Cattell in the section on personality assessment we find (beneath the inevitable elegant portrait) a brief and unfavourable account of the 16PF test mentioning only four scales by name. Is this sufficient information to be useful for a student? Why no mention of the personality sphere, L data, T data, ergs and motivation factors and all the fantastic apparatus of Cattell's system? Obviously space prevents a full coverage but this shallow treatment of so many subjects means that British students in honours courses would not find this book of great value except as a source of references or as a framework for their deeper studies. Furthermore, what is annoying is that it need not have been so shallow because many of the topics covered are only faintly tangential, at best, to personality, as it is usually defined. Thus we find sections on language and thinking, Piaget's contribution, Guilford's concept of intelligence and the cube (yes, Guilford's portrait), examples from intelligence tests and a section on teaching machines.

It seems that Sarason has cast his net too wide, that there is insufficient about too much to be useful for students. Nevertheless, the present reviewer has in the past found the first edition to be a valuable quick source of references.

PAUL KLINE.

SHIACH, G. M. (1972). *Teach Them to Speak*. London: Ward Lock Educational, pp. 256, £1·95.

This book, described by the publishers as a programmed guide to language development, is designed to help teachers to improve the oral language skills of normal children aged 4 to 7 years and also older slower learning or culturally deprived children and mentally handicapped, partially hearing and immigrant children. It has three parts, the first providing the research background and rationale of the language programme, the second listing the materials required and the third and largest section containing the 200 daily class lessons which make up that programme.

The first chapter presents a brief highly selective sample of research findings regarding the role of language in facilitating or mediating cognitive processes such as discrimination and concept learning. There is, however, no account of the process of language acquisition by children and, in particular, the work of psycholinguists relevant to this. Nor, apart from a brief summary of Bernstein's distinction between elaborated and restricted codes, is there reference to the literature on the linguistic problems of culturally deprived children.

The lessons are designed to help teachers to develop in their children the ability to understand simple oral instructions and to describe or explain pictures, objects, actions, etc., in ' well structured,' i.e., grammatically complete and correct short but clear sentences. Most of the lessons, lasting approximately 30 minutes, comprise three different but related activities, each with its own source, e.g., pictures, stories and nursery rhymes. The lessons are intended to form a distinct unit in the child's schoolday and cover basic vocabulary development, concepts such as colour, size and class and relationships of opposition, similarity and difference.

The author claims that the programme is designed to give the majority of children early success and then by very small steps to extend their linguistic development. However, much of the lesson material does not appear to be clearly graded in level of difficulty. For example, the series of stories for oral comprehension are fairly uniform in level. Moreover, the whole emphasis of the programme is upon class teaching, with the teacher maintaining a quick pace to avoid boredom, although the author acknowledges that slower children in a class will need special help and encouragement. Admittedly, the organisation of individual or small group learning situations is much more demanding on the teacher than class approach but the modern infant school is notable for its adoption of the former and it seems a retrograde step to advocate the teaching of language skills by class methods.

Great stress is laid on the structuring of children's oral responses by the teacher, i e., modifying and extending them so as to achieve the desired sentence forms. However, Cazden (1965) compared the effectiveness of this approach termed 'expanding' with that termed 'modelling' in which the adult responds to the child's utterance not by expanding it but by making a fresh statement logically related to it. She found, contrary to expectation, that the modelling approach was more effective in developing the language skills of a group of pre-school children. If this finding is confirmed, it would mean that the emphasis in the present programme upon the expansion technique is misplaced.

The target population seems too wide in terms of age and ability range. It is difficult to see how the same material can be suitable both for nursery school and normal infant school children. This lack of focus is reflected in the content of the programme where, for example, activities such as drawing a circle or square and listening to nursery rhymes are juxtaposed with left-right discrimination, the giving of opposites and fairly advanced story comprehension tasks. Although it is presented as a language programme, the lessons include broader cognitive or perceptual activities such as mechanical rote memory tasks and copying designs. Many of the items are directly modelled on those in the Stanford Binet test and, in general, require convergent rather than divergent or creative responses. Some of the activities, in particular story comprehension, are rather stereotyped and could be monotonous for young children. Finally, the author does not state whether the programme has been validated or even piloted on groups of children prior to publication.

It could be argued that the teaching of oral language skills in British infant schools needs to be more systematic than it tends to be at present and, insofar as this programme makes explicit some of the important aims of such teaching and provides suggestions for structured language activities, it could be regarded as potentially useful, especially for inexperienced teachers. However, teachers need to select carefully from it those activities suitable for their particular children and, if possible, adapt these for small group presentation. They should also critically compare this programme with other more specialised language training programmes recently published in this country, particularly in regard to culturally deprived and immigrant children.

T. Cox.

STONES, E., and MORRIS, S. (1972). *Teaching Practice: Problems and Perspectives.* London: Methuen, pp. 300, c. £3·80, p. £1·90.

This book, which is also available as a paperback, is in three parts. Part 1 discusses the current problematic approaches to practical teaching, Part 2 deals with the innovations, and Part 3 is a collection of mainly American source material which forms an important background to the discussion. The authors claim that the book is really a criticism of 'sitting next to Nellie,' followed by a demand that 'Nellie must go,' and ending with a powerful demonstration that she is redundant anyway. It is a serious and convincing view of the inefficiency of current methods of conducting practical teaching experience, based on a considerable amount of evidence, and contains more than a glimpse of the promise and improvement possible in alternative approaches.

Stones has always argued that the acid test of a student's competence in the field of educational psychology (which he considers to be akin to a theory of actual teaching) is his ability to make use of the principles in the teaching situation. The basic precept of programmed learning, that the aims and objectives of a course oflearning should be clearly and explicitly specified in advance in terms of observable behaviour, is difficult to implement in most current approaches to teaching practice, in that they do not allow the student to go beyond the teaching that is observed. No teaching, however excellent, is ever exhaustively excellent and so the value of observation is necessarily limited.

The authors enthusiastically and convincingly put forward the case for a theory of teaching where the variables are identified and controlled, and the objectives clearly stated in behavioural terms. They consider that the variables relating to teaching can be diagnosed, treated and evaluated, and this is perhaps the central theme of the book. A teacher must first of all analyse the teaching problem before any teaching takes place. Secondly, decisions have to be made about the inter-relationships of the appropriate variables, and, thirdly, the whole exercise needs to be evaluated, with corrections, in terms of the original objectives.

At the very least, prospective teachers would thus be able to get the necessary feedback to enable them to proceed systematically in their teaching. The personality of the teacher is the critical variable in any learning relationship, and help should be given to develop personalities in ways that will enhance the teaching. Certainly the use of simulation techniques could do just that, as well as developing strong links between theory and practice.

The descriptions of the techniques of microteaching, and the degree of control and measure of feedback that they give, are very well presented and argued, as is the case for interaction analysis.

This book is to be strongly commended to teacher educators in colleges and university departments, and to the intending student teacher. Anyone who reads it will be convinced of the need for a complete change in the traditional methods of organising teaching practice—a change that is long overdue.

P. C. PRINCEP.

THOMPSON, G. (Ed.) (1971). *Social Development and Personality.* Chichester: J. Wiley, pp. 764, c. £5·00, p. £3·50.

This volume is one of a series, *Readings in Educational Research*, the stated purpose of which is " the liberal theme of building understanding across the different areas and specialities of educational research and of preventing insularity among educators and educational researchers." In addition, it is intended to further cohesiveness of educational research and to make available to students, teachers, etc., "a comprehensive, useful, and organised set of outstanding published papers representing major fields of educational research."

All these aims are laudable—let us consider how far the present volume meets the intention.

Firstly, the title is something of a misnomer. As the first sentence of the preface reveals, the coverage is that of " a volume of readings related to the social development of boys and girls." This is the emphasis throughout; the *processes* involved in becoming a social adult are well covered—patterns of child rearing, need achievement, identification, imitation, conformity, self-concepts, social perceptions and attitudes, adolescent aggression, social class differences, shame, guilt, and moral development are, on a rapid random sorting, well represented (for students) by the reprinting of important and influential papers in these areas from such researchers as Robert Sears, Bernard Rosen, Michael Lewis, Jerome Kagan, Albert Bandura, Eleanor Maccoby, Kurt Lewin, Nevitt Sanford, David Ausubel and H. J. Eysenck. All these are authoritative names, and the selection from their works has been very well done. On the other hand, coverage of personality, *per se*, is relatively slight.

One displeasing feature, to this reviewer, is the fact that many of the papers have been " adapted or abridged . . . to suit the purposes of this book," so that the material included has been made, slightly, more second-hand than it need have been. The changes have been towards simplicity and this may well help the average student while tending to deprive the ' high flier ' of first-hand knowledge of the style and thought of the original authors.

However, as an additional result, the text reads more smoothly, and none of the factual findings is misrepresented. Indeed, factually, the collection is all that one would wish, and is likely to prove an invaluable single source of material to the keen B.Ed. student, or to second-year students of developmental psychology in conventional honours courses. Theoretically, the linkage between the papers (written in exemplary current jargon) is somewhat tenuous, and one is reminded of J. A. Deutsch's comment : " Of facts there is already too much in psychology, of evidence too little." But this is true of most publications in psychology, and the present collection is no worse than most—indeed, its articles add up to one of the most comprehensive publications to have appeared in the field of socialisation. A useful buy.

S. G. LEE.

YARLOTT, G. (1972). *Education and Children's Emotions.* London: Weidenfeldt and Nicolson, pp. 211, £2·50.

This is a well-written and stimulating book outlining the role of emotion in present-day education. Through discussions on the nature, source and development of emotion, the author presents his own and current theories on affective education in the schools. His style is lucid and he backs up most of his arguments with evidence from recent research, or his own teaching experience.

He describes how the materialist pop-culture society in which we live is held to be responsible for producing a rationalistic, dehumanised personality, and how two sorts of corrective are normally used to counteract the " emotional ill-effects of exposure to mass-media values." These are contact with good, worthwhile literature, and a revival of the old folk culture. Unfortunately, the author feels, these seldom fill a child's basic psychological needs, for, while reading a good book may help him clarify his own problems and understand his emotions better, there are " limitations to the extent to which language can communicate emotional meaning satisfactorily." Language does, however, help the developing child crystallise his own confused mass of feelings The deaf mute is given as an example of how language deprivation may be linked with emotional instability, on account of the deaf child's lack of opportunity to hear how adults express their feelings, and thus remain tied to their own primitive expressions of emotions.

Dr. Yarlott also explains how the non-verbal signals of emotion, such as facial expression and bodily stance, are as equally important as language in conveying emotionality, especially in the classroom situation. The teacher needs to be intensely aware of these, both in himself and in his pupils, in order to be able to attempt any successful affective education. Recent research has shown that teacher's emotional sensitivity can be improved by perceptual and cognitive training—by observation of real-life behaviour.

Once adept in recognising emotions then, how does a teacher carry out affective education? Here the author presents a new approach, suggesting that subjects like science, woodwork and physical education have some bearing on emotion. He argues that practical education makes a child more "self-sufficient and autonomous." Obviously a child gets satisfaction from being able to do things, and upset when he finds simple skills beyond him, but surely this is too facile a view of how to educate all the variety of emotions that exist, and surely this argument of success and failure allied to satisfaction or stress must apply to subjects other than scientific ones? One can grant that if science is presented as relevant to a child's real life concerns, then it will have a significance beyond the immediate present of school life, but it stretches the argument somewhat to suggest that experience in this field colours a child's whole emotional life.

Certainly current school practices in affective education tend to keep to the literary field, although there is the widely held view that drama, art and craft classes are beneficial as an emotional outlet for the child, as if it were a good thing to get rid of as much emotion as possible. The author seems to disagree here, and feels that this procedure is more suited to the emotionally maladjusted than the normal child.

Two aspects of this subject which this reviewer would like to have had dealt with more thoroughly concern just this point—what is the aim of affective education, and is it morally right to attempt to change a child's emotions anyway? The author feels that it is too early to designate the proper role of affective education, and this normally perfectly proper caution is the one irritating factor in this otherwise excellent book. So many questions are raised as to the proper meaning, methods, aims and morality of educating children's emotions, and yet the reader is left frustrated with no conclusive answers.

Perhaps it is unfair to expect any, for within the scope of the book as stated in the preface, this is indeed a valuable, provocative outline of emotional education, which will be enjoyed by teacher and parent alike.

J. MCQUOID.

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Books for review have been selected from the following. (" n.p." means " no price stated.")

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BY W. S. ANTHONY

(*School of Education, University of Leicester*)

SUMMARY. Extraversion, as tested by Eysenck and his followers, is found on average to increase from 7 years to 13 years, and to decrease from youth to middle age; there appears to be a peak normally at 13 or 14 years. On the other hand, general ability increases until the twenties. If we assume that a person who is ahead (or behind) in one of these developments is also likely to be similarly ahead (or behind) in the other development, then this explains a general finding asserted by Eysenck and Cookson (1969) and others in this *Journal*, namely that the correlation between extraversion and ability is positive in young children and negative in older pupils and students. Some other, related, findings are also explained in the same way

RESEARCH documented by Eysenck and Cookson (1969), Elliott (1972), Entwistle (1972) and others, has generally shown that young extravert school children tend to be more able than young introverts but that among older pupils and students this correlation disappears and is reversed. The observed correlations (collated by these writers) between extraversion scores and ability scores are usually weak and individually insignificant but they are fairly consistent in justifying the generalisation. Why does the correlation change from positive to negative? Eysenck and Cookson suggest that the introvert is a late developer. But what is it to be a late developer? The purpose of the present paper is to show that if we attend to the normal development of Eysenkian extraversion, and to the normal development of ability, we shall thereby come to a fairly simple and coherent view of the changing relation between extraversion and ability.

S.B.G. Eysenck (1965) presents the mean extraversion scores, on the Junior Eysenck Personality Inventory, of about 9,000 children aged 7–16 years. In her data, mean extraversion scores increase rather rapidly from 7 to 10 years (in boys) or to 11 (in girls), after which there is an irregular slower increase to a maximum at 13 (in boys) or 14 (in girls), followed by a somewhat irregular *decline*.

Evidence of an increase in average Eysenckian extraversion scores from 11 years to 13 or 14 years is also provided by Callard and Goodfellow (1962) and McAllister and Marshall (1969). Callard and Goodfellow obtained extraversion scores on the Junior Maudsley Personality Inventory of 3,559 boys, aged 11–14 years; averaging the results over 12 schools, for each of the four age-years, the minimum extraversion was at 11 and the maximum at 13. However, among the four urban (and relatively large) secondary modern schools, averaged, the maximum extraversion was at 14 years. McAllister and Marshall obtained 1,012 children's average extraversion scores on the New Junior Maudsley Inventory, at ages of 11 to 14, in two fairly large (and presumably urban) secondary modern schools; the minimum average score was at 11 years and the maximum at 14. It is therefore possible that children at, or leaving from, large/urban secondary modern schools, and their cultural heirs under comprehensivisation, normally continue to increase in extraversion beyond the age of 14.

Eysenckian extraversion scores have been found to *decline* with age in adults. Thus Eysenck and Eysenck (1964) report that age is correlated negatively with extraversion scores on the Eysenck Personality Inventory. Gutman (1966) reports a study of extraversion scores on the Maudsley Personality Inventory of 726 people aged 17–25 years and 693 people aged 30–94 years. The 17–25-year-old people scored more than the people in their thirties, and the decline continued to the forties and fifties ; in the sixties the average was higher and among the 70 to 94-year-olds it was lower again than in the younger groups. Eysenck and Eysenck (1969) report a study of extraversion scores on the PEN (psychoticism, extraversion, neuroticism) Inventory of 2,391 persons. Scores are reported for a 10–29-year-old group, a 30–49-year-old group, and a 50–69-year-old group. Average scores in extraversion declined between the 10–29 group and the 30–49 group, and this decline was present in all sex and social class sub-groups. There was a further average decline from the 30–49 group to the 50–69 group, but this decline was not present in all sub-groups.

We may therefore synthesise this information as follows : three Eysenckian inventories have been used to obtain average extraversion scores at different ages in childhood, and these yield results which are consistent with each other and which, taken together, show an increase from 7 years to 13 years, a further increase to 14 years in some sets of data but a decrease to 14 years in others, and a decrease to 15–16 years among the relatively small and possibly unrepresentative samples of people tested at 15 and 16. Three other Eysenckian inventories have been used to obtain average extraversion scores at different ages from youth to old age, and the reports of these results are consistent with each other and also consistent with the reported results from childhood, since a decline is shown from youth to middle age and generally to old age (but with a possible hump in the sixties). If we assume that these six methods of scoring ' extraversion ' are in some degree measuring a unitary quantity, then there is clearly a general increase followed by a general decrease ; this implies a peak or maximum, and our data suggests 13 or 14 as the age at which average extraversion reaches this maximum.

The normal development of Eysenckian extraversion, therefore, appears to consist of an increase up to 13 or 14 years, followed by a decrease into middle age and beyond. But this ' normal ' peak is derived from the average of many individuals. A child who is consistently *early* in this development would at first be more extraverted than his age-mates, but he would reach his peak sooner than they, and in later years he would be *less* extraverted (more introverted) than his age-mates. Similarly, a consistently late developer would, in early years, be more introverted than his age-mates, but in descending, late, from the peak, he would in these later years be more extraverted than his age-mates. If this seems paradoxical or absurd, the reader may refer to Tanner (1970, p. 81, Figure 3 a), for an analogy in the realm of physical growth. The occurrence of early and late peaks in the development of a measured characteristic tends to invert the rank order of individuals in the characteristic, i.e., it tends to reduce the re-test reliability over the period where the peaks are occurring. This would account for the low re-test (stability) correlations in Eysenckian extraversion mentioned by Entwistle (1972, p. 146). Our reasoning contrasts with the Eysenck-Cookson idea of the introvert being the *late* developer ; in the late school years, and into adulthood, he is the *early* developer, for his score is more typical of those *older* than he than it is of his age-mates.

On the other hand, the normal development of general ability (conventional intelligence scores) apparently continues as increase until the twenties (Bayley, 1970). The normal decline in reasoning scores after the twenties will be discussed later in this paper but need not concern us here.

Let us suppose that, at any given time, a person who is ahead of his age-mates in the development of extraversion is also likely to be ahead in the development of ability, and that, similarly, a person who is behind in the development of extraversion is also likely to be behind in the development of ability. This is purely a supposition, though a natural one, which will enable us to make sense of the correlations between extraversion and ability. It follows, then, that in early childhood the child who is ahead in these developments will be high in ability *and* high in extraversion, whereas the child who is behind will be low on both, and therefore there will be a positive correlation between extraversion and ability. But as a group of children approach the age of 13, some among them who are ahead, reach their peak extraversion early and start ' downhill ' towards introversion, while they are still increasing in ability, for the peak of ability is still many years ahead. Since these ahead are still the most able but *not* now the most extraverted, the correlation is weakened. As the average children pass over their extraversion peaks, the correlation becomes zero ; and when, after 14, most of the group is decreasing in extraversion, the children who are ahead are the least extraverted but the most able, while the children behind are the most extraverted but the least able ; that is to say, the correlation between extraversion and ability in these (hypothetical) children is now negative.

S. B. G. Eysenck (1965) presents correlations between extraversion and verbal IQ ; four correlations are given for each of the years 11 to 16. At 11 and 12 the correlations are positive ; at 13 and 14, four are positive and four negative ; at 15 and 16, seven are negative and one positive. If the four correlations at each age-year are averaged, the mean correlations are : at 11, +·24 ; at 12, +·11 ; at 13, +·03 ; at 14,·00 ; at 15, −·12, ; at 16, −·14. These average correlations are, of course, consistent with the theory expounded here, and illustrative of the generalisation which was mentioned in the first paragraph.

Entwistle and Welsh (1969) selected from a group of 14-year-old children, high and low ability groups. Among the low ability group there was a positive correlation between extraversion and ability, and among the high ability group a negative correlation. In the present view the low ability group would tend to be late developers approaching their peak extraversion, and among whom there would thus be a positive correlation between extraversion and ability, whereas the high ability group would tend to be early developers, i.e., would tend to have passed their extraversion peak, and among whom there would, therefore, tend to be a negative correlation between extraversion and ability.

Child's (1966) results are explained in a similar way. He found that among children between 11 and 14, the highest and lowest social classes were the least extraverted. Assuming that the lowest social classes tend to be behind in the development of extraversion and ability, they would be well below their peak extraversion. The children of the highest social classes were mostly aged 13 and 14 and were, presumably, ahead in development and thus had passed their peak extraversion.

Ley *et al.* (1966) tested 144 adults whose average age was 46·45 years, sd 13·10 years. Extraversion scores on the Maudsley Personality Inventory were correlated positively with two reasoning tests (Progressive Matrices and

Cattell's 16 PF intelligence factor) and negatively with the Mill Hill Vocabulary test. Reasoning test scores are considered to have their normal peak in the twenties, but knowledge, including vocabulary score, has been found normally to increase into the thirties and possibly beyond (Foulds and Raven, 1948, p. 139 ; Bayley, 1970, pp. 1184-5). In the case of the reasoning test scores, then, we should expect most of these subjects to be declining both in these scores ***and*** in extraversion, so that the people who are ahead in these developments will be both less able and less extraverted than those behind, giving rise to the positive correlations. However, since a normal vocabulary peak is later or in doubt, we need not be surprised that vocabulary scores correlated (non-significantly) negatively with extraversion, in these subjects.

Entwistle (1972), drawing upon work of Warburton, considers that extraversion, as derived from Cattell personality tests, is correlated positively with scholastic attainment at ages up to and including 14, but that in older pupils and students the correlation is negative. On the present theory we could explain this if we could verify that extraversion, scored from Cattell's tests, develops in a similar way to Eysenckian extraversion, by coming to a peak which should normally be at 14–15 years. The factors contributing to extraversion (according to Entwistle) are A, E, F, H, and Q_2—. Coan (1966, pp. 743-745), drawing upon work of Sealy, shows the apparent development of these factors between the ages of 11 and 25 (see also Sealy and Cattell, 1966). From Coan's diagrams, averaging scores between sexes, it appears that: factor A (affectothymia) comes to its maximum at 16–18 years ; factor E (dominance) has a subsidiary peak at 15–17 years but a higher peak at 21 , factor F (surgency) has its maximum at 16 ; factor H (parmia) has its maximum at 21 ; factor Q_2 (self sufficiency) has its lowest point (i.e., Q_2— has its maximum) at 15–16 years. (Sealy and Cattell, 1966, p. 182, suggest that university students show an early decline in surgency, which of course coheres with the present theory.) Therefore, while none of the five factors is shown to have a peak at precisely the age expected (14–15), yet three of them do have their maximum at approximately the correct age to enable the present theory to account for the change (as inferred by Entwistle) in correlations between Cattell's extraversion and scholastic attainment. The discrepancy could be explained by the fact that the over-fifteens in Entwistle's review were (he writes) selected on intelligence, i.e., they were, on present theory, early in development, and would show the negative correlation before the normal peak. However, Entwistle's (1972) review is unclear, for his Table 1 shows that the observed correlations of Q_2+ and E— (' Introversion (2) ') with attainment under 15 years are mostly ***inconsistent*** with his conclusion.

This paper has attempted to explain or account for the development of the correlation between extraversion and ability by reference to the development of extraversion and the development of ability. Attention has been directed mainly to the data on Eysenckian extraversion, because these seemed clearer than the data on Cattellian extraversion. In the view presented here, it is unnecessary to assume that a person who is ahead in the development of extraversion or ability at one time of life will be likely to be ahead at another time of life, although that might be true It should also be noted that the idea of ' development ' includes the possibility that the phenomena are socially as well as biologically determined. The main point is, that when we gather together what we know about the quantitative development of extraversion and ability, the the known development of the relation between them follows as a natural and coherent consequence.

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PERSONALITY AND BEHAVIOUR IN SCHOOL

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SUMMARY. The responses of first and second year secondary pupils on the JEPI and a Behaviour in School Inventory were cluster analysed. Four clusters emerged which were internally homogeneous and stable over time. These are described and related to ability, achievement and motivation measures. It is postulated that two dimensions underlie the cluster pattern—adjustment and compliance. This is interpreted in terms of previous research. The meaningfulness of the JEPI dimensions in the school setting is discussed.

INTRODUCTION

The JEPI has been used extensively in studies relating personality and academic attainment despite lack of evidence of validity. To date there is little research that enables an accurate estimate to be made of what a JEPI score means in the school setting, yet as Cronbach (1970) has pointed out, " the more fully and confidently a test can be interpreted, the greater its validity." Validity studies have, in the past, concentrated on the use of teacher ratings of pupil behaviour as criterion measures, but have usually reported low intercorrelations (Eysenck and Cookson, 1969 ; Eysenck and Pickup, 1968). Although halo effect has been put forward as the major factor in such relationships, the inventory itself has also been criticised. Bennett (1973), for example, argued that low validity was a function of certain dubious assumptions underlying the scoring scheme, and of the generality of many of the items. Thus, although all ratings have known psychometric shortcomings (Ebel, 1961), these are likely to be exacerbated in this instance since teachers rate actual school behaviour, whereas pupils have to use different situational reference points in responding to JEPI items. The use of ratings as criterion measures in validity studies would, therefore, appear to be of doubtful value.

As a further step towards the interpretation and meaning of the JEPI, an alternative strategy has been adopted in the present study. This involves examining the relationship between pupils' self-reported personality, and self-reported behaviour in the classroom using an inventory designed by Youngman (1969). If, by cluster analysis, clear typologies emerge which are defined by certain admixtures of personality and behavioural items, interpretations within the school setting could be facilitated. To assess the educational relevance of such typologies, relationships with ability, attainment, and motivation measures are also examined.

DESIGN

Sampling.

To assess the stability of the cluster patterns two samples of secondary school children were used.

(i) 274 first-year pupils of mean age 12 years 3 months, mean VRQ 102·5.
(ii) 288 second year pupils of mean age 13 years 3 months, mean VRQ 102·3.

The samples were drawn from two comprehensive, two grammar, and two modern schools in order to achieve heterogeneity in terms of VRQ. The mean JEPI scores of neither sample deviated significantly from the norms in the handbook (Eysenck, 1965).

Measures.

(i) Junior Eysenck Personality Inventory (Eysenck, 1965).
(ii) Aberdeen Academic Motivation Inventory (Entwistle, 1968).
(iii) Verbal Reasoning Test 86 (Moray House).
(iv) Attainment in English derived from end of term tests, and scaled against VRQ for comparability across schools (Yates and Pidgeon, 1957).
(v) Behaviour in School Inventory (Youngman, 1969).
This inventory is based on previous research and interview data with secondary school teachers. It measures a range of typical behaviours in the classroom. For the purposes of validation, teachers rated each pupil on all items, and moderate validity is claimed.

Procedure.

Both the JEPI and Behaviour in School Inventory (BSI) were marked by item prior to a cluster analysis, for which an iterative relocation technique was used (Wishart, 1969). In this manner children are grouped together on the basis of the similarity of their item response patterns on the 100 items contained in the two inventories. Error sum of squares was used as the similarity estimate. An error curve plot (analogous to a scree plot in factor analysis) indicated that for both samples the four cluster classification provided the optimum solution. In other words, in each sample, four distinct groups emerged which were internally homogeneous. In order to ascertain the characteristics of the four groups, note was taken of those inventory items that best discriminated between the groups (Table 1). Mean scores for VRQ, English and Motivation were computed for each group at both age levels.

RESULTS

Cluster Patterns.

The four pupil clusters were very similar at both age levels indicating a high degree of stability over time. The dominant items in each cluster for sample (i) are tabulated, in cryptic form, in Table 1.

Cluster 1 is labelled ' sociable, outgoing,' and is mainly composed of JEPI extraversion items, although the BSI items confirm the general picture.

Cluster 2 is composed of children who seem contented with life, both generally and in the school setting. Overall, the items appear to delineate a ' well-adjusted ' group which bears a strong resemblance to Thelen's (1967) ' teachable ' group.

Eysenck and Eysenck (1963) stated that the impulsivity aspect of extraversion correlated with poor adjustment. This appears to be substantiated by the composition of cluster 3. All JEPI items relate to impulsivity and neuroticism, and associated BSI items concern inattention, fidgeting, and lack of interest.

Cluster 4 contains more BSI than JEPI items, but together they provide a coherent picture of worry, reticence and compliance. This appears similar to the 'inhibited' factor originally postulated by Adcock (1965).

Both the alignment of impulsivity and neuroticism items in cluster 3, and the syndrome of cluster 4 appeared in a previous cluster analysis of the JEPI (Bennett, 1973).

TABLE 1

ITEMS DEFINING THE FOUR CLUSTERS.

Item	Response	Inventory	T
CLUSTER 1—SOCIABLE, OUTGOING (N=79)			
Ever told a lie?	Yes	JEPI (L)	1·00
Often talk to person next to you? ..	Yes	BSI	0·96
Like plenty of excitement?	Yes	JEPI (E)	0·96
Like going out a lot?	Yes	JEPI (E)	0·96
Shout back when shouted at?	Yes	JEPI (E)	0·95
Happy and cheerful?	Yes	JEPI (E)	0·95
Let yourself go at a party?	Yes	JEPI (E)	0·95
Like mixing with other children? . ..	Yes	JEPI (E)	0·95
Sometimes start laughing in class? ..	Yes	BSI	0·89
Rather be alone?..................	No	JEPI (E)	0·03
Always quiet in class?	No	JEPI (L)	0·05
Rather sit and watch at parties?	No	JEPI (E)	0·06
Often feel lonely?	No	JEPI (E)	0·09
Have frightening dreams?	No	JEPI (S)	0·10
CLUSTER 2—WELL-ADJUSTED (N=59)			
Like mixing with other children?	Yes	JEPI (E)	1·00
Usually have all things you need?	Yes	BSI	1·00
Happy and cheerful?	Yes	JEPI (E)	1·00
Always do homework?	Yes	BSI	0·98
Always got your pen or biro?	Yes	BSI	0·97
Pay attention when teacher talking? ..	Yes	BSI	0·95
Ask teacher for help when in difficulty?	Yes	BSI	0·95
Answer teacher back if told off?	No	BSI	0·00
Books get scruffy quickly?	No	BSI	0·02
Often late for lessons?	No	BSI	0·02
Rather be alone?	No	JEPI (E)	0·02
Punished by teacher?	No	BSI	0·03
Does worry stop you sleeping?	No	JEPI (S)	0·05
Lots of things annoy you?	No	JEPI (S)	0·05
Things confiscated by teacher?	No	BSI	0·05
Are you moody?	No	JEPI (S)	0·05

(Continued)

TABLE 1—*continued.*

Item	Response	Inventory	T
CLUSTER 3—POORLY ADJUSTED (N=73)			
Often fed up?	Yes	JEPI (N)	0·95
When shouted at shout back?	Yes	JEPI (E)	0·93
Laugh and giggle in class?	Yes	BSI	0·90
Often talk to person next to you in class?	Yes	BSI	0·90
Worry about awful things?	Yes	JEPI (N)	0·88
Mind often wander off job?	Yes	JEPI (N)	0·85
Daydream in class?	Yes	BSI	0·85
Often look out of class window?	Yes	BSI	0·85
Touchy about things?	Yes	JEPI (N)	0·85
Restless so can't sit for long?	Yes	JEPI (N)	0·84
Difficult to sit still for long?	Yes	BSI	0·81
Get into trouble because don't think?	Yes	JEPI (E)	0·81
Can't make up mind?	Yes	JEPI (E)	0·81
Always quiet in class?	No	JEPI (L)	0·10
Always do as told?	No	JEPI (L)	0·15
Always finish homework before play?	No	JEPI (L)	0·22
CLUSTER 4—WORRIED, COMPLIANT (N=63)			
Sometimes cheerful, sometimes sad	Yes	JEPI (N)	0·95
Ask teacher for help?	Yes	BSI	0·90
Normally have all things you need?	Yes	BSI	0·90
Always do homework?	Yes	BSI	0·89
Often fed up?	Yes	JEPI (N)	0·87
Always do as told?	Yes	BSI	0·86
Walk quietly about school?	Yes	BSI	0·84
Mostly work on your own?	Yes	BSI	0·81
Worry about things?	Yes	JEPI (N)	0·80
Punished by teacher?	No	BSI	0·06
Push other children about?	No	BSI	0·13
Had things confiscated by teacher?	No	BSI	0·19

T is a standard measure of the degree of atypicality of the cluster on the particular variable.

Performance.

The mean VRQ, English and Motivation scores of the four groups at each age level are indicated in Table 2.

TABLE 2

MEAN VRQ, ENGLISH AND MOTIVATION SCORES FOR ALL CLUSTERS.

Variable	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
	1st year	2nd year	1st year	2nd year	1st year	2nd year	1st year	2nd year
VRQ	107·4	107·1	106·7	105·2	99·0	98·8	97·2	98·5
English	36·5	36·9	38·0	36·0	27·3	28·8	26·9	28·5
Motivation	16·5	16·1	19·2	18·4	14·5	13·6	17·4	17·2

Certain patterns in Table 2 are immediately apparent. The clusters fall into two distinct groups in terms of ability. At both age levels the mean VRQ scores of clusters 1 and 2 are significantly higher ($P < \cdot 01$) than those of cluster 3 and 4, by 't' test. Of equal interest is that the equivalent clusters in both year groups exhibit almost identical performance characteristics. This indicates that the cluster patterns are stable over the age range considered.

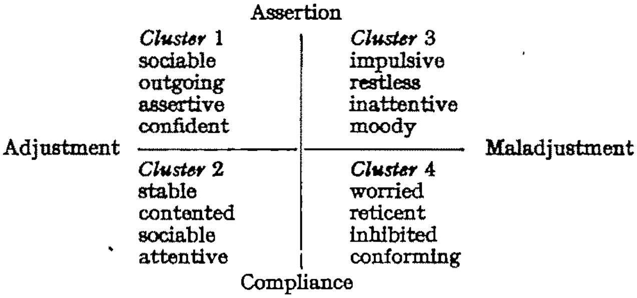
The mean motivation scores substantiate the cluster patterns. The well-adjusted group display the highest motivation and the poorly-adjusted group the worst. The difference in mean scores is significant beyond the ·01 level. The relatively high level of motivation of cluster 4 no doubt reflects the adherence of the group to school norms, even though they are of low ability.

DISCUSSION

Two dimensions appear to underlie the four clusters: adjustment–maladjustment and assertion–compliance. Fig. 1 illustrates this.

FIGURE 1

TWO DIMENSIONS UNDERLYING FOUR CLUSTERS.



In addition, this framework reflects the performance dimensions of high-low VRQ, and high-low motivation. Thus, cluster 2 consists of pupils with high VRQ/low motivation, cluster 3 low VRQ/low motivation, and so on. The clusters themselves also make sense in terms of previous research on adjustment and school behaviour. A number of studies have reported on the better educational progress of well-adjusted pupils (Douglas and Ross, 1968) and the low intellectual ability of maladjusted groups (Yule and Rutter, 1968). Stott (1969) has also noted the low intelligence of maladjusted children. Indeed, clusters 3 and 4 clearly equate with two of his types of maladjustment. Cluster 4 parallels his 'unforthcoming' or 'effectance-deficient' type. Such children are dependent, timid and wary of experimenting with new activities. Their mental development is usually poor. Similarly cluster 3 contains many elements of his 'inconsequent' type. These are restless, distractable and fail to take the consequences of their behaviour into account. In school they play the fool and are a nuisance to their teacher. The lower VRQ of these two types is clearly demonstrated in Table 2.

Conformity to school rules is a basic requirement of all pupils and it is, therefore, not surprising that a compliance dimension is evident. The interaction of compliance and adjustment has, in fact, been noted in observation studies. Flanders (1965) identified traits which seemed to distinguish well-adjusted and poorly adjusted pupils. In particular, the factors of compliance (willingly, doing as told by an authority figure) and dependence (doing as is expected) were important discriminators. These same factors serve to differentiate clusters 2 and 4 in the present study. The clusters therefore appear to have high face validity but do they facilitate interpretation of JEPI scores in the school setting? In that stable admixtures of JEPI and BSI items emerged, they do, but only if the JEPI is marked by item, and not by the conventional scoring scheme. The adjustment dimension appears to include elements of both neuroticism and extraversion and, because of this lack of clear replication, the interpretation of these dimensions is not greatly improved.

An alternative to marking by item is to base items measuring the two dimensions in a clear situational framework. It now appears to be generally accepted that social behaviour results from the interaction of environments, with their patterns of demands and expectations, and basic personality types (Getzels and Thelen, 1960 ; Argyle and Little, 1972). Thus, the basic behavioural dimensions in any situation will depend on the relative strengths of both sets of influences. In the school setting it seems likely that institutional demands are sufficiently strong to swamp the effects of individual differences in personality. In such a situation a general inventory such as the JEPI is of limited utility and validity. Such an interpretation would help to explain the consistently low levels of correlation found in studies relating the JEPI and school attainment measures. It would, therefore, seem more useful to design inventories which have a clear meaning in the particular social situations encountered. Only then can valid inferences be made concerning the effect of behaviour on performance.

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INEQUALITIES OF TEACHER-PUPIL CONTACTS

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SUMMARY. The ways in which teacher-pupil contacts are distributed between 179 pupils in five first-year junior school classes are examined. Inequalities of distribution are demonstrated, and evidence from teacher ratings suggests that the children receiving high levels of contact are either active, bright, personable children, or active, duller, miscreants. Different kinds of contacts are received by these two groups of children.

INTRODUCTION

THIS paper takes its title from a study by Jackson and Lahaderne (1967) in which the authors described the interactions between teacher and pupils in four sixth grade classrooms, the most interesting of which concerned the variability in the interactions that occurred. They classified interactions under three headings: instructional (concerned with curriculum content or educational objectives); managerial (concerned with classroom rules and procedures); and prohibitory (concerned with keeping order and dealing with misbehaviour). They showed that classrooms varied in the proportions that these kinds of contacts were likely to occur and that boys received more contacts than girls, especially in the case of prohibitory contacts.

On the basis of such findings they pointed out that whilst it is possible to talk about classrooms in general it should be remembered that the nature of classroom life depends on the particular classroom involved. What does it mean, they ask, when we describe a child as being a member of a sixth grade classroom of 30 pupils, since such a description tells little about " the social density of the child's psychological world and the relative saliency of the teacher in that world " (p. 210).

The present research confirms the variability between classrooms in the kinds of contacts that occur, and focuses on the variability in the contacts that children experience. Further, some explanation is attempted of the differential distribution of contacts.

METHOD

Sample.

The sample comprised five first year English junior (primary) school classes and their teachers. The classes were selected on the basis of their geographical convenience. Each teacher was told that the study was investigating the ways pupils approached their teachers, and that they would be given full details at the conclusion of the research. No teacher refused to co-operate.

Data Collection.

The main data used were the verbal contacts between teachers and individual pupils. These contacts were categorised by an observer who was either seated in the classroom (in rooms where it was possible to overhear conversations from a fixed position) or was mobile (in high activity classrooms where observer movement was not disruptive). The categories used were such as to maintain distinctions between 'work' and 'procedural' contacts (analogous to Jackson and Lahaderne's 'instructional' and 'managerial' categories), teacher or pupil initiation, disciplinary contacts, and 'response opportunity' (the frequency with which teachers chose children to answer questions, proffer information, etc., when the class was being addressed as a whole). Contacts were defined as utterances or strings of utterances that were concerned with a single category, e.g., a 'work' contact could consist of either a phrase, sentence, or several sentences, whilst two sentences addressed consecutively to the same child would be classed as two contacts if each sentence was concerned with a different category. (Preliminary data analyses were carried out using both the number of contacts and the length of contacts as the variables, and since similar results were obtained with both the simpler number of contacts measure was used.)

The reliability of the category system was ascertained by calculating the percentage agreement between two coders who classified two 30-minute audio tapes. The percentages obtained ranged from 88 to 100 per cent. This was considered satisfactory.

The classrooms were visited on at least six successive days and data were collected for all the day's lessons that were conducted in the 'home' classroom. The day-to-day stability of the pattern of teacher-pupil contacts was ascertained by taking each child's daily tally of contacts with the teacher (separately by teacher or pupil initiation) and obtaining a pupil rank order for each day of observation. Kendall's 'coefficient of concordance' (Siegel, 1963) was then calculated as a measure of the agreement between ranks over the days of observation. The obtained values varied between ·54 and ·63 which, across six days, were significantly different from chance ($P < \cdot 001$). Observations beyond six days did not significantly increase the values of the coefficients.

In the week following the collection of data on pupil-teacher contacts, the children were observed in order to obtain an estimate of the amount of time that they spent on work and non-work activities. These were defined in terms of behaviours reported in Garner (1972) whose system of observation produced three categories, work, non-work and administrative time. Four children were observed simultaneously for eight 10-minute periods that were distributed evenly between the before and after morning break.

Furthermore, the teachers rated their children on 11 five-point scales. These were concerned with intellectual potential, amusingness, conduct, school performance, attitudes to work, imaginativeness, the teacher's liking for the child, independence for work, stability, sociability and appearance. These ratings were collected after the observations had taken place, each teacher completing a scale for all the children before moving on to the next scale, etc. The class order was varied randomly from rating form to rating form. Information on parental occupations was also collected from the teachers and classified according to the Registrar-General's (1964) system of classification. Details of the rating scales are appended (see Appendix). The Moray House Picture Intelligence Test 1 was administered to provide an estimate of each child's intelligence.

The 179 children included in the study were thus described in terms of the following variables:

Teacher ratings

1. Intellectual potential.
2. Amusingness

Other measures

12. Socio-economic status (high score=high status)

3. Conduct
4. School performance
5. Attitude to work
6. Imagination
7. Liking for child
8. Independence
9. Stability
10. Sociability
11. Appearance
13. IQ
14. *Pupil initiated work contacts
15. *Teacher initiated work contacts
16. *Teacher initiated direct questions
17. *Pupil initiated procedure
18. *Teacher initiated procedure
19. *Response opportunity
20. *Discipline contacts
21. Percentage of time spent working whilst observed
22. Percentage of time spent on irrelevant activities whilst observed

NOTE—An asterisk indicates that the measure used was the percentage of all such contacts within a child's classroom that were enjoyed by that child.

DATA ANALYSIS

The results are organised into two sections. The first describes the frequency of occurrence of different kinds of teacher and pupil contacts in the several classrooms that were observed, and attempts to give some indication of how these contacts were distributed amongst the various class members.

(1) The findings reported in this section illustrate both the high rates of contacts in the classes and the substantial differences between children in the amounts and kinds of contacts they had with their teachers. Table 1 shows the rates at which teacher-pupil contacts occurred and indicates the variability between classrooms in the number of contacts, the kinds of contacts, and in the relative proportions initiated by teachers and pupils.

TABLE 1

AVERAGE HOURLY INTERACTIONS INITIATED BY TEACHERS AND PUPILS.

Classroom	Teacher Initiated		Discipline	Response Opportunity	Pupil Initiated		Total
	Work	Procedure			Work	Procedure	
1	29	10	12	16	65	10	142
2	28	10	25	20	32	12	127
3	14	4	10	13	18	12	71
4	22	5	14	13	10	4	68
5	14	12	22	8	25	13	94

The contacts that are listed in Table 1 were not equally distributed among the children in the classes, some children having relatively few contacts with their teacher, others having considerably more. Descriptions of the ranges of contacts on the various categories are too detailed to print and are available from the senior author. Some indication of the findings can be provided by an examination of some of the categories for classes 3 and 1. In class 3, for example, three children received 26, 24 and 23 teacher initiated work contacts in the observation period, whilst some children received two, and one received none. The same kind of range was evident in respect of response opportunities (five children receiving between 20 and 25, nine receiving two or less); discipline (one child received 31 contacts, seven children received none); and pupil initiated contacts generally (six children initiated fewer than five contacts, two children initiated 42 and 60, respectively). Similar findings emerged from class 1: four children initiated fewer than 20 contacts, five more than 80; eight children received fewer than four response opportunities, three more than 30; etc.

Despite this unevenness in the distribution of contacts between children, it could have been the case that children who experienced a low incidence of one kind of contact received a relatively high incidence of other sorts of contact: thus, it could be that children who initiate a lot of contacts tend to receive few teacher initiated contacts.

TABLE 2

CORRELATIONS BETWEEN CHILDREN'S SCORES ON SELECTED CONTACT CATEGORIES (SPEARMAN'S 'RHO').

	Teacher	Discipline	Response Opportunity	Pupil Initiated
Teacher initiated (excluding discipline and response opportunities)	1	+·44**	—·01	+·15
	2	—·05	+·39*	+·08
	3	+·41*	—·27	—·12
	4	—·08	+·52**	+·33*
	5	+·71**	+·17	+·37*
Discipline	1		·00	+·14
	2		+·01	+·02
	3		+·11	+·37*
	4		+·09	+·01
	5		—·10	+·46**
Response Opportunity	1			+·39*
	2			+·43**
	3			+·02
	4			+·37*
	5			+·21

*P<·05 **P<·01

If it were the case that compensation did occur between the various kinds of contact, e.g., if children who failed to receive teacher initiated contacts made up for this by themselves initiating contacts, then negative correlations between different categories would be expected. In the event, the only significant correlations are positive, indicating a total lack of compensation and a tendency for those who receive one kind of contact to be those who receive other kinds of contact (see Table 2).

(2) The second section is concerned with the relationships that are obtained between the teachers' ratings of their children, their 'socio-economic status,' intelligence, and work habits, and the kinds of contacts that the children received. To effect this description, 'cluster analysis' was used.

As Entwistle and Brennan (1971) have noted, cluster analysis has not been widely used in educational research and hence it is necessary to provide a brief non-technical description of what it involves. The basic principles of cluster analysis are best described by means of a spatial analogy. The analysis deals with individuals who have been described in terms of variety of attributes and who can thus be thought of as occupying a plot in a multi-dimensional space having as many dimensions as the number of attributes used in the description. If one were to plot the positions occupied in this multi-dimensional space by all the members of a group of individuals then any similarities between individuals would be represented by the closeness of their locations in that space : the closer together, the greater the degree of similarity. Cluster analysis is the generic label for a variety of techniques that can be used to represent the closeness of individuals' plots in the multi-dimensional space.

Even this abbreviated description of the technique makes it apparent that if different degrees of closeness ' in space ' are required before individual plots will be regarded as being sufficiently close to warrant being said to be members of a cluster, then a different number of clusters will be required to describe the individuals' locations in space. Thus, if no restrictions are imposed, then all the plots will be members of a single cluster, whilst the requirement of identical locations would tend to produce as many clusters as there were individuals. In the study to be described the ' K—means ' solution (Brennan, 1972) was used : this comprises solving the similarity-cluster number problem by defining *a priori* the number of clusters to be produced and then by following a sorting procedure to allocate individuals to the closest cluster. For further technical details reference should be made to the Entwistle and Brennan study already cited.

This technique thus produces a description of the patterns of occurrence of various levels of the attributes included in the analysis, leading to the production of a series of types or patterns of ratings, characteristics and teacher-pupil contacts.

Since this part of the data analysis involved the grouping together of classes where differing levels of teacher-pupil contacts had occurred, and where teachers tended to have differing mean values on their pupil ratings, the various scores involved were converted into standard scores for each class before they were pooled for the cluster analysis. This procedure resulted in each attribute being given a mean of zero and a standard deviation of one. (The exception to this was the intelligence measure for which the standard scores were calculated across all classes. This was appropriate since, being a standardised measure, it was not influenced by the idiosyncrasies of the various classrooms and teachers).

The computer was programmed to produce cluster solutions between nine and two, the successively reduced solutions being produced by merging together those clusters that are most similar. It was decided to utilise the six-cluster solution since beyond this only cluster three undergoes any reasonable degree of subdivision and inspection of the cluster scores showed no evidence of any substantial difference between clusters three, seven and nine.

Table 3 indicates the cluster's mean standard scores on the variables. An asterisk adjacent to a score indicates that the spread of individuals in the cluster around the stated mean is rather high, i.e., asterisked scores are not too representative. The table also includes a statement of the percentage of boys in the six clusters and the proportions of the cluster coming from each of the five classes involved.

TABLE 3

MEAN STANDARD SCORES FOR CLUSTERS AND DETAILS OF CLUSTER MEMBERSHIP.

Variables, Ratings, etc.	Cluster					
	1	2	3	4	5	6
1. Intellectual potential	·14	1·22	—·57	—1·18	·71	·73
2. Amusingness	·92	·99	—·51	— ·74	—·04	1·13
3. Conduct	—·55	·55	·12	—1·27	·69	—1·41
4. School performance	·03	1·11	—·52	—1·21	·78	·74
5. Attitude to work	—·05	·96	—·30	—1·23	·67	—·27
6. Imagination	·68	1·02	—·67	—1·12	·58	·74
7. Liking for child	·49	·99	—·48	—·98	·33	1·02
8. Independence	—·12	·98	—·32	—·96	·56	·02
9. Stability	·60	1·23	—·49	—·62	·00	·46
10. Sociability	·57	1·16	—·35	—·86	—·08	1·23
11. Appearance	—·36	·94	—·28	—·53	·39	·91
12. Parents' SES	—·27	·81	—·36	—·65	·60	·57
13. IQ	·09	·52	—·42	—·65	·60	·63
Classroom behaviours :						
14 P initiated work contact	·13	·84	—·28	—·20	—·18	2·60
15. T initiated work contact	·20	·19	—·32	1·04 *	—·39	·75
16. T questions	·30 *	—·46	—·10	·60 *	—·15	·09
17. P initiated procedure	·15	·51	—·26	—·01	—·27	4·21 *
18. T initiated procedure	·40	·98	—·53	·40	—·37	2·36
19. Response opportunity	·22	·89	—·15	—·43	—·24	1·39 *
20. Discipline contacts	·68	—·20	—·29	·84	—·59	3·21
21. P work time	—·27	·52	·01	—·49	·25	—1·19
22. P non-work time	·37	—·59	—·03	·51	— ·24	1·13
Number of pupils	27	22	62	23	42	3
Percentage of boys	70·4	40·9	48·4	65·2	42·9	33·3
Percentage from class 1	22·2	31·8	22·6	13·0	11·9	—
Percentage from class 2	18·5	27·3	16·1	17·4	14·2	—
Percentage from class 3	18·5	9·1	14·5	34·8	30·9	66·7
Percentage from class 4	22·2	31·8	16·1	17·4	19·1	33·3
Percentage from class 5	18·5	—	30·7	17·4	23·9	—

The distributions of boys and girls within the various clusters were examined by use of the chi square test, as were the relative incidences of cluster members between the five classes. Two significant chi squares were obtained : the first indicated that boys were over-represented in cluster 1 ($\chi^2 = 3{\cdot}77$, 1 df, $P < 0{\cdot}5$), and the second that cluster 2 was unevenly distributed between the classes ($\chi^2 = 10{\cdot}54$, 4 df, $P < {\cdot}05$).

Cluster 1 comprises children who are close to the sample mean on measured and rated ability, school performance and attitudes to work. They tend to be rated rather highly on items concerned with 'personality' and are thought to be amusing, stable, sociable and imaginative. Their teachers tend to like them and interact with them at above average levels. Their conduct is rated as below average, they spend a below average amount of time at their prescribed work, and (possibly as a result) receive relatively high numbers of disciplinary contacts.

The children in cluster 2 are seen to be bright, outgoing, hard-working and well-behaved, and they are well liked. Their contacts with teacher are interesting. The teacher initiates a high proportion of procedural contacts—possibly because they are reliable children—and also provides them with a high frequency of response opportunities. In contrast, the teachers do not initiate many work contacts or ask many direct questions ; this is possibly due to the high level of pupil initiated work contacts and the apparent tendency for teacher initiated work contacts and direct questions to be associated with children whose work output and attitudes are low. This cluster is unequally distributed between the classes, being over-represented in classes 1, 2 and 4, and under-represented in classes 3 and 5. Since there were bright children in classes 3 and 5 who were also rated highly on other attributes, the unevenness seems to indicate a difference between teachers in their response to bright stable children.

Cluster 3 contains a third of the sample and their scores on almost all the variables are slightly below the sample average. Their teacher ratings indicate that they are seen as being rather ' nondescript.' They are neither very bright nor very dull, they pose no control problems, and neither receive nor initiate many contacts.

The children in cluster 4 have low scores on the teachers' ratings, and are the only group who have a mean rating below the neutral point on the ' liking ' scale. Their poor work habits and naughtiness appear to result in their receiving above average amounts of contact in all categories except response opportunities.

Cluster 5 comprises fairly bright, well-behaved children who, whilst possessing most of the ' virtues,' do not possess them in abundance. They work well but are below average in all kinds of contact with their teachers.

Cluster 6 is odd, and reflects the presence in the sample of three children who were bright, amusing, well-liked and extremely sociable, yet badly behaved. They showed no evidence of sustained attention to classroom tasks. They both initiated and received high levels of contact on almost all categories, and appear to be an exaggerated version of cluster 1.

DISCUSSION

The data on the hourly incidence of teacher-pupil contacts confirms Jackson's observation that, " In the small but crowded world of the classroom, events come and go with astonishing rapidity " (1968, p. 149). The high rate at which these contacts occur tends to result in their being of short duration, and it is difficult to see how teachers can become deeply involved in children's problems of understanding when only a minute or so is available for them to make their diagnosis and give their help.

This time pressure might account for the findings of Carnegie (1972) who analysed several hours of audio tape obtained from the classrooms of two of the teachers in this study. She was interested in teachers' expectations which she classified as either authoritarian (e.g., " The answer is nine because I say so "), definitive (e.g., " Two times three is six because it is "), emphatic (e.g., " Why did the lady cry ? Well, wouldn't you if that had happened ? "), or causal/ consequential (e.g., " It won't all fit in there because if you put any more in it will start to come out again "). She found that authoritarian and definitive explanations predominated, with causal/consequential accounting for a mere 2 per cent. Her conclusion was that time pressures were a likely cause of the high incidence of non-causal type explanations since it took less time to tell a child *that* such and such was the case than to explain *why* it was so. It is possible, therefore, that the high incidence of contacts might reduce the levels of cognition that are used in the classroom.

A further point for consideration concerns the inequalities of contacts. If it is assumed that contacts (other than disciplinary) are beneficial, then many children were being deprived of such benefits. This assumption would seem to be reasonable : helping a child with his work at the very least indicates that work matters are legitimate classroom concerns. The eagerness with which young children clamour to answer questions or do jobs for the teacher makes it likely that a lack of opportunity to do these things would lead to a loss of enthusiasm and involvement in classroom life. The evidence is unambiguous : numbers of children receive little contact of any kind, and if the assumption about the effects of this is justified then this is a matter for concern. However, the inequality is not surprising. In classrooms containing over 30 children more than one child usually requires some kind of contact at any given point in time, and the teacher is faced with a choice between children. Given this situation the problem from the child's point of view is that of being ' noticeable.'

The cluster analysis provides some indications as to what this ' noticeability' might consist of, although a problem in discussing the results is that of deciding whether the teacher's view of the child determines how she interacts with him or *vice versa.* The data cannot resolve this ' chicken and egg ' dilemma, but it might be reasonable to assume that the process is interactive: an impression is formed on the basis of a child's behaviour which then acts as an interpretative framework within which subsequent behaviour is construed, which in turn leads to teacher expectations, which in turn helps determine the child's subsequent behaviour, etc.

Viewed overall, the analysis reveals certain trends. One is for children who are not distinctive in either personality or conduct to receive less than average contacts, regardless of whether the indication tends to be negative (cluster 3) or positive (cluster 5). If teacher contact is desired then being average and passive (c.f. their conduct ratings and pupil initiated rates) is not the way to obtain it.

Clusters 2 and 4 contain the children who obtain most contact—albeit of different kinds—and on the teacher ratings are exaggerated versions of clusters 5 and 3. The children of cluster 2 experience high levels of pupil initiated contacts and of teacher initiated response opportunites and procedural contacts. It can only be assumed that either teachers find contacts with these ' good ' pupils to be rewarding, or that they wish to encourage them, or that the pupils' own contact seeking induces teachers to respond to them. The high levels of certain contacts that teachers initiate with their badly behaved and relatively dull pupils seem to be explicable in terms of the necessity for their control for the continued well-being of the classroom culture.

Cluster 1 is in some ways a cross between cluster 2 and 4. Composed predominantly of boys, their contact patterns seem to be a function of their activities (their poor conduct and work habits) and their likeable personalities.

Overall, therefore, there seems to be a tendency for active children—either hard workers who initiate teacher contacts, or miscreants who behave badly—to receive contacts. The nature of the contacts appears to be dependent on the nature of their activeness. The reverse of this is also true : passivity results in low levels of all kinds of contact.

In some ways the clusters are reminiscent of the findings of Silberman (1969) and Good and Brophy (1973). In both these studies teachers were asked which children they would like to keep in their classes for the sheer joy of it, which children they were concerned about, which children they were indifferent towards, and those children they would like to be removed from their classes.

These groups were labelled as 'attachment,' 'concern,' 'indifference' and 'rejection' respectively. Clusters 3 and 5 bear marked similarities to the indifferent group, who were seldom noticed and had much less contact than other children. Cluster 4 and the 'rejection' group are clearly identifiable in terms of contact patterns and their teacher liking ratings.

Cluster 2 is very similar to the description of the attachment group, especially in the Good and Brophy study, whilst cluster 1 shows several similarities to the 'concern' group. It is interesting to note that different approaches tended to produce similar pupil-teacher contact types, both across grade levels and cultures. More interesting, though, is Good and Brophy's conclusion that " the attitudes teachers hold towards students do influence the ways in which they interact with those students " (1973, p. 14). If their view is accepted, then it seems reasonable to assert that a child's 'noticeability' depends on his teacher's attitude towards him and his activity level, and that the kind of activity determines the kind of contacts he will tend to receive.

These findings confirm Jackson and Lahaderne's (1967) finding that the nature of classroom life depends on the classroom into which fate deposits you, and on the characteristics you are deemed to possess. What is needed now is research into the effects of differential teacher-pupil contacts on pupil attitudes and attainment to determine the importance of the inequalities that exist.

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APPENDIX

PUPIL RATING SCALE

Teachers were asked to rate the children in their class on the 11 bi-polar scales listed below. In the administration of the rating scale a separate sheet was used for each attribute, the sheets having five columns, the extremes of which were described in terms of the extremes of the attributes that were used. The centre column was labelled as 'average for the class ' The complete class was rated on each attribute before the next sheet was presented, and the class order was randomised from sheet to sheet. The scales were :

Attribute	*High*	*Low*
Temperament	Impeturbable	Easily upset, highly strung.
Intellectual potential.	High in relation to class.	Low in relation to class.
Dependence.	Highly independent	Very dependent.
Appearance.	Very attractive child.	Most unattractive.
Imagination.	Very imaginative.	Most unimaginative.
Liking.	Would miss if child left.	Would be pleased if child left.
School performance.	Does well in school work.	Does badly at school work.
Conduct.	Most well-behaved.	Least well-behaved.
Amusing	Good sense of humour.	Humourless.
Attitude to work.	Hard-working.	Lazy.
Sociability.	Very popular with children.	Unpopular with other children.

DIFFERENTIAL PROGNOSIS OF READING BACKWARDNESS AND SPECIFIC READING RETARDATION

By W. YULE

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SUMMARY. Multiple regression techniques have been used very infrequently to define samples of children with reading difficulties. Earlier studies have shown that children with specific reading retardation differ from generally backward readers on sex distribution, IQ distribution, and other factors. The present paper reports preliminary results of a five-year follow-up of disabled readers and provides evidence that whilst the prognosis for any reading disability is poor, children with specific reading retardation have a poorer prognosis than backward readers. The distinction between backwardness and retardation in reading is therefore seen to be both meaningful and of prognostic importance.

INTRODUCTION

THE literature on reading difficulties abounds with inconsistencies in terminology and definition. However, it has become customary to differentiate between those children who, irrespective of their ability, are at the bottom end of a continuum of reading attainment (*backward readers*) and those children who are *underachieving* in relation to their chronological age and general level of intelligence. " Under-achievers," in this context, are usually called *retarded readers*.

Whilst the need to differentiate between the two groups has been expressed for many years (Schonell, 1935 ; Department of Education and Science, 1964), the method whereby this differentiation could be made has been the subject of much controversy in the past (Crane, 1959 ; Burt, 1959). However, 10 years ago, Thorndike (1963) argued convincingly that the only statistically satisfactory way to define ' underachievement ' is through the use of regression techniques. Independently, British psychologists (Ravenette, 1961 ; Fransella and Gerver, 1965 ; Yule, 1967) have successfully applied such techniques to educational problems that arose within clinic settings. It appears that there are statistically and psychometrically acceptable ways of defining underachievement in reading.

A number of questions remain to be answered. Firstly, whilst it may be be possible to differentiate two categories *statistically*, does such an exercise result in psychologically and educationally meaningful groups ? As Davis and Cashdan (1963) noted, there is little point in distinguishing children with specific reading retardation from the general group of backward readers unless the two groups are distinguishable on criteria other than reading scores. Secondly, do these definitions have any practical implications ? In particular, is the outcome in terms of eventual reading attainment different for the two groups?

The first set of questions has been examined by Rutter and Yule (1973), who conclude that specific reading retardation is sufficiently different from general reading backwardness in terms of its sex distribution, neurological correlates and its association with speech and language disorders, to make it a useful educational concept. Elsewhere, it has been shown that specific reading retardation occurs at well above the theoretically expected frequency (Yule *et al.*, 1973). The suggestion is that there is a meaningful group of children with specific reading retardation which is not explicable simply in terms of being at the bottom of the continuum.

The purpose of this present paper is to examine whether the prognoses for the two types of reading difficulty are similar or distinct. On *a priori* grounds, one could make two mutually contradictory predictions. Firstly, one might argue that because retarded readers are so much more intelligent than backward readers, they will *not* need extra help to catch up but will do so on their own accord. Secondly, one might argue that because the retarded readers are so much brighter, their unexpected failure in learning to read suggests some sort of specific handicap. Without help, they should do less well. A third prediction would be that there would be no differences at follow-up, the distinction being purely theoretical, having no practical significance. Clearly, the only way to test the prognostic implications of these classifications was to follow the children through school for as long as possible.

METHOD

In the Isle of Wight Studies (Rutter *et al.*, 1970), the following definitions of reading backwardness and reading retardation were used:

> *Reading backwardness* was defined as an attainment in reading accuracy or comprehension on the Neale test which was 2 years 4 months or more below the child's chronological age.
>
> *Reading retardation* was defined as an attainment on either reading accuracy or reading comprehension which was 2 years 4 months or more below the level predicted on the basis of the child's age and Short WISC IQ. Predictions were based on a multiple regression equation (Yule, 1967).

Applying these definitions to children at age 9 to 11 years, 155 backward readers and 86 retarded readers were identified in the total school population of some 2,300 children. The two groups overlapped considerably, and had no fewer than 76 children in common. Thus, there were 165 poor readers identified in 1964.

In the Autumn terms of 1968 and 1969, 152 (or 92 per cent) of these 165 poor readers were traced and individually tested. 144 were originally designated 'backward readers,' 79 were originally 'retarded readers,' there being an overlap of 71 between these groups. A control group of 184 children was formed for purposes of comparison by selecting every twelfth child from the class lists. All these groups of children were put through an extensive battery of psychological tests and psychiatric interviews. As in 1964, they were again tested on the Short WISC, the Neale Analysis of Reading Ability, and the Schonell Spelling Test, and, in addition, the Vernon Arithmetic-Mathematics test was individually administered.

We felt justified in continuing to use the Neale test on the grounds that (*a*) we were collecting our own control data, and (*b*) we were most interested in the 'tail' of the distribution which contained the poorest readers.

RESULTS

The first point to be examined is how did all the poor readers fare at follow-up, some four to five years after they had been originally identified. To examine this point, the reading data from the two complete groups of poor readers, together with the results from the control group, are presented in Table 1. Because of the low ceiling of the test (it is only standardised up to the age of 12 years; Neale, 1958), the distributions are presented rather than just the mean reading ages. 81 (56 per cent) of all backward readers and 46 (58 per cent) of all retarded readers scored more than two standard deviations below the control group mean on accuracy, and closely similar figures emerge on the comprehension subtest. In terms of reading ages, this means that at 14½ years of age, both groups of poor readers score on average at the 9-year reading level. Thus, it can be seen that the majority of children who were found to have severe reading difficulties in their primary school continued to lag far behind in reading to the end of their compulsory school days.

TABLE 1

DISTRIBUTION OF READING AGES.

Accuracy	184 Controls		144 Backward		79 Retarded	
	N	%	N	%	N	%
At test ceiling: 12y 10m	32	17·39	0	—	0	—
At mean or above: 11y 10m to 12y 9 m	94	51·09	6	4·17	2	2·53
Mean to —1 SD: 10y 6m to 11y 9m .. .	32	17·39	19	13·19	9	11·39
—1 SD to —2 SD: 9y 2m to 10y 5m....	13	7·07	38	26·39	22	27·85
More than 2 SD below mean: 9y 1m and below	13	7·07	81	56·25	46	58·23
Comprehension						
At test ceiling: 13y 0m	2	1·09	0	—	0	—
At mean or above: 11y 11m to 12y 11m	126	68·48	24	16·67	12	15·19
Mean to—1 SD: 10y 9m to 11y 10m	37	20·11	20	13·89	14	17·72
—1 SD to —2 SD: 9y 8m to 10y 8m	7	3·80	19	13·19	9	11·39
More than 2 SD below mean: 9y 7m and below	12	6·52	81	56·25	44	55·70

Table 2 presents some of the data bearing on the question, do backward and retarded readers fare differently? The groups which are compared consist of (*a*) 73 children who were originally backward only, and (*b*) 71 children who were both backward and retarded, i.e., who were so far behind as to be well below the level expected on the basis of their intelligence. (For simplicity, the very interesting but small group of eight children who were retarded but not also backward have been excluded from consideration.)

TABLE 2

COMPARISON BETWEEN 'RETARDED' AND 'BACKWARD' READERS AT FOLLOW-UP.

	73 Backward only		71 also Retarded	
	Mean	SD	Mean	SD
Age (months)	174·64	3·48	176·21	3·56
Prorated Full Scale IQ	85·63	16·15	98·41	15·17
Neale Analysis of Reading Ability Rate (months)	112·92	17·02	105·97	16·18
Accuracy	112·47	17·94	105·72	16·24
Comprehension	116·74	22·01	112·90	20·24
Vernon Arithmetic/Maths. Score	15·66	7·38	18·96	10·00
Schonell Spelling Age	102·01	19·11	94·11	19·00

It can be seen that while matched for age, the two groups differ markedly in respect of IQ—no less than 13 points. As expected, the retarded readers continue to be of higher intelligence. This followed from the definition of the groups in 1964, but it is interesting that the effect remains at follow-up.

The first point in Table 2 concerns the reading scores. On all three measures of reading, the duller, backward readers do better than the brighter retarded readers. In other words, the intellectually more favoured group are somewhat more handicapped on their reading.

Two other points should be noted from Table 2. Firstly, the specifically retarded readers appear to have a higher score on the mathematics test than do the generally backward readers. Secondly, by way of contrast, they score less well on the spelling test.

In order to take account of any initial level differences between the two groups, analyses of covariance were carried out to test the statistical significance of the differences. The results are summarised in Table 3 which shows that all the differences are highly significant after controlling for initial IQ and scholastic attainment levels. Thus, the difference between the groups on accuracy is statistically significant at P <0·0025 (F=9·53 with 1 and 140 df); whilst the difference on comprehension is statistically significant at P <0·0006 (F=14·44, with 1 and 140 df). In both cases, as seen in Table 2, the brighter retarded readers have a *lower* score at age 14½ years.

TABLE 3

Difference Between Groups—Analysis of Covariance—Partialling out 1964 IQ and 1964 Attainment Level.

Dependent Variable	Co-variates	Multiple R	F	P
1. Accuracy	1964 IQ 1964 Accuracy	0·75	9·53	<0·0025
2. Comprehension	1964 IQ 1964 Comprehension	0·70	12·44	<0·0006
3. Mathematics	1964 IQ	0·60	7·26	<0·0075
4. Spelling	1964 IQ 1964 Spelling	0·83	10·12	<0·0019

The same applies to spelling where the difference is significant at P <0·0019 (F=10·12 with 1 and 140 df). In sharp contrast, the retarded readers made better progress in mathematics than did the backward readers (P <0·0075, F=7·26 with 1 and 141 df), emphasising the specific nature of the reading disability in these children.

DISCUSSION

Whilst all poor readers have a poor prognosis in reading and spelling, children with specific reading retardation have a significantly poorer outcome than do the general group with reading backwardness. That this worse prognosis is a specific function of the specific reading retardation is shown by the better prognosis with respect to mathematics, the only other scholastic subject which was assessed. These findings provide the beginning of a justification for using complex multiple-regression equations (Yule, 1967) in the identification of disabled readers. The distinction drawn between backward and retarded readers, at least within the large group where these conditions overlap, has some prognostic value. One cannot assume any longer that bright children with reading difficulties will catch up. Good intelligence in a disabled reader is no talisman against long-lasting reading difficulties.

It is clear from this preliminary report of the follow-up study of poor readers on the Isle of Wight that if a child has a severe reading problem at the age of 10, the chances are very high that he will remain handicapped in reading to the end of his school days. Just how handicapped depends on what is the practical, functional meaning of having a reading age of only 9 years (the average reading age of all 144 backward readers) at 14½ years of age. Clearly, this is a barrier to many academic pursuits, and has repercussions in many other social situations.

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THE EFFECTS OF AGE, STIMULI AND ORDER OF PRESENTATION OF THE STIMULI ON CONSERVATION OF NUMBER

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SUMMARY. Two experiments were conducted to investigate possible differences in observed conservation of number due to the stimuli utilised. In the first experiment, 20 kindergarten, 20 first grade, and 20 second grade subjects were given Piaget's one-to-one correspondence experiment: one half had trials with small candies (Smarties or M and Ms) followed by trials with paper clips and one half had trials with paper clips followed by trials with small candies. Significant F ratios were found for the main effect, grade, and for the interaction between stimulus and order of presentation. This result was taken as indicating that when small candy trials were first, this helped performance on the paper clips, while when paper clip trials were first, this had a slight opposite effect on the small candy trials.

The second experiment investigated the three suggested interpretations of the findings of the first experiment: according to learning theory, according to an attentional hypothesis, and according to Piaget's theory of equilibration. The results tended to support the first two interpretations. The implications of the results of the two experiments, for Piagetian training studies and for education, were discussed.

INTRODUCTION

An individual at the stage of pre-operational thought is capable of conceptualising qualitative invariants such as the permanence of an object. However, when he achieves the stage of concrete operations, he is capable of conceptualising quantitative invariants. This is the crux of conservation. An individual gives evidence of conserving when he is aware that a given dimension, such as weight, mass, or number, does not change quantitatively despite irrelevant perceptual changes, such as shape or order. Some recent studies (Calhoun, 1971; Mehler and Bever, 1967; Roll, 1970) have confused conservation with what will be termed pseudo-conservation. In these studies, the dimension, number, was changed quantitatively and, thereby, dealt with inequalities which cannot be considered to be conservation.

Since, by definition (Piaget, 1968), conservation requires operations, an individual who is capable of conservation is at the stage of concrete operations. Number is considered to be among the first dimensions on which most individuals give evidence of conservation (Inhelder, 1968). Therefore, conservation of number can be used to indicate the onset of concrete operations. The knowledge of an individual's ability to conserve number is important for two reasons. First, it is important to know at which stage an individual is functioning since learning is dependent upon the individual's stage of cognitive thought (Iano, 1971; Piaget, 1964). Second, Piaget (1965) contends that " conservation is a necessary condition for all rational activity . . . " (p. 3). A number can, therefore, be viewed intelligibly only if it remains constant, irrespective of changes between its elements. These should both be of importance to educators of young children.

There have been many replications of Piaget's (1965) number-concept studies supporting his description of the development of these concepts (Almy, Chittenden and Miller, 1966 ; Beard, 1963 ; Dodwell, 1960 ; Elkind, 1961). In all of these studies, the older the children, the higher the stage of development of the number-concept.

The method most often used in conservation of number studies is the one-to-one correspondence experiments described by Piaget (1965). However, despite Piaget's many variations of this type of experiment, he neglected certain potentially important variables. Zimiles (1966) studied several of these variables. Two of these, to be further studied here, are the significance of the stimulus materials to the subject and the order in which trials utilising different stimulus materials are presented to the subject.

Zimiles found no differences, within subjects, on conservation of number when the stimulus materials were varied. However, he questions the appropriateness of his materials for this purpose. Uzgiris (1964) found significant differences in conservation scores when different stimulus materials were presented to the subjects. Piaget (1965) reports differences in the age of apparent acquisition of the concept of additive composition of classes for different classes (e.g., girls and children ; brown beads and beads ; poppies and flowers). Some studies of pseudo-conservation have found different stimulus conditions to result in different conservation scores (Calhoun, 1971 ; Mehler and Bever, 1967). However, Roll (1970) found no difference in pseudo-conservation due to stimulus desirability. There appears, from this review, to be some evidence, though limited, that various stimulus materials will result in different performances on conservation tasks which are otherwise the same.

Zimiles found that the order of presentation, of different stimulus conditions, affected performance on the conservation tasks. He found that the first response, conserving or non-conserving, would be repeated on subsequent trials. It is, therefore, hypothesised that when the more significant stimulus material (to the subject) is presented first, it will help the subject's performance on the less significant stimulus material. The inverse is also hypothesised. This will be demonstrated if a statistically significant interaction effect between the stimulus materials and their order of presentation is present.

EXPERIMENT I

METHOD

Subjects.

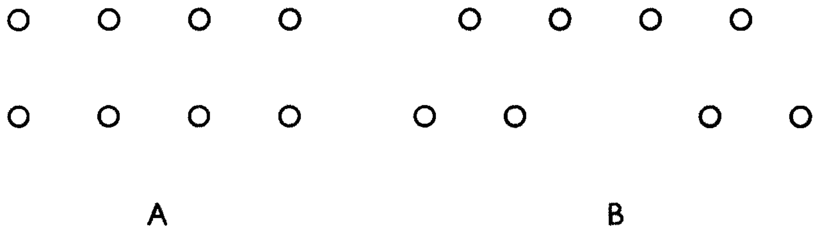
Twenty subjects were randomly selected from each of the kindergarten, first and second grades of an urban elementary school. The 20 kindergarten subjects had a mean chronological age (CA) of 5–6 with a range of 5–4 to 5–9. The 20 first grade subjects had a mean CA of 6–7 with a range of 6–5 to 6–9. The 20 second grade subjects had a mean CA of 7–6 with a range of 7–4 to 7–9.

Materials.

The stimulus materials employed were small candies (smarties or M and Ms), all of the same colour, and paper clips. The stimuli were presented on a sheet of white paper approximately 21·6 cm. by 27·9 cm. Positions for the placement of the stimuli were marked by small dots on the edge of the paper (see Figure 1). The stimuli in part A of Figure 1 were placed approximately 3·2 cm. apart. In part B the stimuli which were spread were approximately 6·4 cm. apart.

FIGURE 1

Arrangement of Stimuli. Display A Was Used Initially. Display B Shows Stimuli Positions After Their Rearrangement.



Procedure.

Six trials were given individually to each subject. Three trials were with small candies and three trials were with paper clips. Each of these sets of three trials were given first to one half of the subjects. The first step was to familiarise the subject with the stimuli. Then four stimulus items were placed in a line in front of the subject. He was asked to place the same number of items on the paper from a pile next to him. The child was given as much help as necessary until the items were placed in one-to-one correspondence and he agreed that the two rows were the same. One row was then spread out. The row to be spread, the left or right, was randomly determined so that not all three of the trials with a given stimulus had the same row manipulated.

When the small candies were the stimulus, the subject was told that he would be allowed to have one of the rows of candies (the rows were indicated to let the child know what was meant by ' row '). Following this the subject was asked, " Does one of the rows have more candies or do they both have the same number ? " The subject's response was followed with the question, " Why ? " The subject was then permitted to take the row of candies he had selected. The same procedure was followed when paper clips were the stimulus except for the offer of one of the rows to the child.

The criterion for conservation on a given trial is that the child shall respond that the two rows still had the same number of stimulus items and that in his explanation he shall give evidence of either reversibility (e.g., they can be put back the way they were), identity (e.g., none have been added or taken away), or compensation (e.g., as one row gets longer it also gets more spread out). Since Piaget (1965, 1968) insists that true conservation requires operations, one of these explanations is necessary to meet his criterion of conservation. For a subject to be classified as a conserver on a given stimulus he must meet the criterion for conservation on all three trials with that stimulus material.

RESULTS

The data analysis was accomplished by a three-way analysis of variance, proposed by Mandeville (1972) as an appropriate technique for analysing dichotomous data in a repeated measures format. Lunney's (1970) guidelines for using ANOVA with dichotomous data were adhered to (see Table 1).

TABLE 1

ANALYSIS OF VARIANCE: STIMULUS MATERIALS, ORDER OF PRESENTATION, AND GRADE IN SCHOOL—EXPERIMENT I.

Source of Variation	Degrees of Freedom	Mean Squares	F
Between Subjects	59		
A (Stimulus)	1	·21	·88
C (Grade)	2	3·68	15·33*
AC	2	·01	·04
Subject W. Groups	54	·24	
Within Subjects	60		
B (Order)	1	·01	·08
AB	1	3·01	25·08*
BC	2	·11	·92
ABC	2	·01	·08
B×Subj. W. Groups	54	·12	
Total	119		

* $P<{\cdot}01$.

There was a statistically significant different number of conserving responses in the different grades $(F=3{\cdot}68,\ P<{\cdot}01)$. The higher the grade in school, the greater the number. This finding holds true across the other variables. There were no significant differences between the stimulus materials or between the orders of presentation of the materials.

There was a significant interaction effect between the stimulus materials and their order of presentation $(F=3{\cdot}01,\ P<{\cdot}01)$. The subjects who were given the small candy trials first demonstrated conservation on more trials, both for candies and for paper clips, than the subjects who were given the paper clip trials first. This interaction effect can be seen in all the age groups (see Table 2).

TABLE 2

NUMBER OF CONSERVING RESPONSES FOR GRADE, STIMULUS MATERIAL, AND ORDER OF PRESENTATION—EXPERIMENT I.

Grade	Stimulus	Order of Presentation		
		First	Second	Total
Kindergarten	Candies	4	0	4
	Paper Clips	0	2	2
	Total	4	2	6
First Grade	Candies	7	4	11
	Paper Clips	3	7	10
	Total	10	11	21
Second Grade	Candies	9	7	16
	Paper Clips	5	9	14
	Total	14	16	30
Total	Candies	20	11	31
	Paper Clips	8	18	26
	Total	28	29	57

There was no significant interaction effects between grade and stimulus materials, between grade and order of presentation, or between grade, stimulus materials, and order of presentation of the materials.

DISCUSSION

The finding that more of the older children than the younger children demonstrated conservation, reaffirms previous findings and demonstrates that the children in the present study were not atypical.

The interaction effect, which was hypothesised and found to be statistically significant, can be interpreted in three ways. First, learning could have resulted when the small candies were presented first due to the inherent reinforcement value of the small candies to the child, especially since he was allowed to keep and eat them immediately. After the first response, conserving or non-conserving, a response set was generated that continued for all of the subsequent trials of both stimuli. In other words, the learning which resulted from the candy trials generalised to the paper clip trials and the non-conserving response when the paper clips were presented first generalised to the subsequent candy trials blocking learning from taking place. However, this interpretation has a serious limitation. It does not account for the different number of conservers in the three age groups; also it does not account for the strong effect that small candies being presented first had on the later paper clip trials while the opposite effect (the paper clips being presented prior to the candies) though present, was not as strong. In addition this interpretation would lead to extinction over time. Therefore, if a time lag of two to three weeks existed between the two stimulus presentations, this interpretation would expect no generalisation due to the extinction of the response.

Second, the subjects, who evidenced conservation, may have had the necessary skills or concepts before either stimulus presentation. When the candies were presented, greater attention was paid and, therefore, the subjects demonstrated the skills or concepts which they possessed. This interpretation, as the first, relies on the hypothesis that the subject developed a response set on the first stimulus material which continued on the second stimulus material. This is necessary to account for the generalisation from the first stimulus to the second. Due to this, it would be expected that no generalisation would occur if the time between stimulus presentations was increased to two or three weeks.

The third interpretation utilises Piaget's equilibration theory. According to this interpretation, when the candies were presented first, the subject paid greater attention to the stimulus than when the paper clips were presented first. Due to this high degree of attention, the subject in the transitional stage was put into a state of disequilibrium and through the process of equilibration achieved concrete operations and conservation of number. Since he had achieved this accommodation on the first stimulus, the child was capable of using it to conserve on the paper clip trials. When the paper clips were presented first, the subject who failed to conserve number merely continued responding in the same manner on the later candy trials. According to this interpretation, the transference of conservation from candies to paper clips is permanent and will transfer to any stimulus over any time lag. This is because an operation was acquired rather than a response set being learned.

EXPERIMENT II

A study involving a time lag of two weeks was conducted to investigate further these three interpretations. The first two interpretations would hypothesise no generalisation from candies to paper clips. However, the third interpretation, that of equilibration, would expect greater performance on paper clip trials after candy trials whatever the amount of time between them. This is because the first two are based on a response set being learned which would extinguish over time while the last is based on the achievement of a type of thought, operational, which once acquired is not extinguishable.

METHOD

Subjects.

Sixty subjects were randomly selected from five first grade classes of two urban elementary schools. The subjects had a mean CA of 6–9 with a range of 6–7 to 7–0.

Materials.

The stimulus materials, and the manner of their presentation, were identical to those described in Experiment I.

Procedure.

Thirty subjects were randomly assigned to receive three trials with candies, the other 30 subjects receiving trials with paper clips. Two weeks later all of the subjects were given three trials with paper clips. In all other ways, the procedure and the scoring criterion were identical to those described in Experiment I.

RESULTS

The data analysis was accomplished by a two-way, fixed effects, repeated measures analysis of variance (see Table 3). Although there were significant differences between the groups receiving different stimuli at time I ($F=5\cdot26$, $P<\cdot05$) and between the first and second presentations ($F=6\cdot75$, $P<\cdot05$), these main effects were nullified and accounted for by the significant interaction between them ($F=10\cdot0$, $P<\cdot01$). The subjects who were given the candy trials first met the criterion for conservation of number more often than those who were given the paper clip trials first. Those subjects given the candy trials first demonstrated conservation more often on the candy trials than on paper clip trials two weeks later. There was no practical difference between the groups on the second set of trials.

TABLE 3

ANALYSIS OF VARIANCE: STIMULUS MATERIALS PRESENTED FIRST AND SECOND—EXPERIMENT II.

Source of Variation	Degrees of Freedom	Mean Squares	F
Between Subjects	59		
A (Stimulus First)	1	1·63	5·26*
Subj. W. Groups	58	·31	
Within Subjects	60		
B (Time)	1	·83	6·75*
AB	1	1·20	10·0†
B × Subj. W. Groups	58	·12	
Total	119		

* P < ·05 † P < ·01

TABLE 4

NUMBER OF CONSERVING RESPONSES FOR TIME AND FIRST STIMULUS MATERIAL—EXPERIMENT II.

Stimulus for First Presentation	Time		Total
	I	II (Paper Clips)	
Candies at Time I	27	16	43
Paper Clips at Time I ..	14	15	29
Total	41	31	72

DISCUSSION

The results of the second experiment seem to indicate that, as was seen in the first experiment, performance on a conservation of number task is enhanced if the stimulus material used is of significance to the subject. In the present experiments, candies which the subjects could keep were deemed to be of a much higher significance to the subjects than paper clips. The results of the second experiment also demonstrate that if subjects have an interval of two weeks between significant and non-significant stimuli, the performance on the non-significant stimulus is not affected by the significant stimulus having been presented earlier.

When the results of the first experiment are viewed in light of the results of the second experiment, the third interpretation, that the candy trials induced equilibration, can be eliminated. This is necessary, since if equilibration had occurred the subjects would have developed cognitive structures which would have enabled them to demonstrate conservation of number on the less significant stimulus material regardless of the time lag. This is an integral part of Piaget's (1972) equilibration theory.

Since the other two interpretations of the first experiment both involved generalisation, the second experiment does not distinguish between them. However, it appears that the attentional interpretation is a stronger one than the interpretation based upon learning theory. The learning theory interpretation is a more complex explanation involving extinction of the learned response in just two weeks in addition to generalisation. The simpler attentional explanation is, therefore, easier to justify and accept. In addition, there is no evidence that learned conservation will naturally extinguish over a short time span. On the contrary, the evidence of the studies which have trained conservation would seem to refute this hypothesis involving extinction. The attentional interpretation, as well, better accounts for the different effect that candies have on paper clips than paper clips have on candies noted in the first experiment. At the same time, it seems plausible that some children, who have recently attained this level of conservation, may only demonstrate this ability under optimal conditions which would include the stimulus materials being of high significance to the children. The present authors, therefore, agree with the interpretation suggested by Uzgiris (1964) that attention is greater for different stimuli and, therefore, performance varies according to this significance.

The results discussed here have implications for many of the Piagetian training studies. It is apparent that studies attempting to demonstrate gains in conservation due to training with little or no time lag between the training procedure and the post-test are of questionable validity. It is suggested, in light of the present findings, that there be a time lag of at least two weeks between these two facets of training studies in this area.

These results also have implications for education relating to didactic materials used in the teaching of concepts. It appears from these results that the development of concepts would be enhanced by the utilisation of didactic materials that are of demonstrated significance to the children. Generally at present, didactic materials are brightly coloured and presumed to be of interest to the learner. A case in point is the materials used in Montessori programmes. There is no evidence that these materials are of significance to the learner, especially the disadvantaged learner with whom Montessori programmes have had limited success (Mietzitis, 1971). This appears to be a special case of the situation to which Sigel (1971) has applied the construct ' distance.' Materials that are often used as reinforcers in behaviour modification studies (e.g., candy) might be more appropriate to use as didactic materials. Further studies might well consider the shift from such specific concrete reinforcers to more symbolic techniques.

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COGNITIVE DEFICITS IN CHILDREN WITH SPINA BIFIDA AND HYDROCEPHALUS : A REVIEW OF THE LITERATURE

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Summary. In this paper clinical and experimental studies reported in the decade 1962–1972 relating to general intellectual functioning and to specific cognitive deficits in children with spina bifida and hydrocephalus are reviewed.

The introduction gives a short account of the extent and nature of the disorders. Next follows a section on general intellectual findings, these rather ' global ' studies indicating that the largest group of spina bifida children are likely to have a fairly severe physical handicap with associated hydrocephalus and to fall in the IQ range 70–90. The third section is concerned with verbal ability in general, and short-term verbal memory in particular, and the fourth with specific cognitive deficits as regards visuo-spatial perception, tactile perception and visuo-motor ability Finally, the implications of these studies for research and educational placement are discussed.

THE EXTENT AND NATURE OF THE DISORDER

Recent years have seen a growing interest in the variety of problems—administrative, educational, medical and social—presented by the increasing numbers of spina bifida children who survive infancy. A series of epidemiological surveys have shown considerable variations in the incidence of the disorder, ranging from 4 per 1,000 in the mining area of Glamorgan (Laurence, 1966) to 1·5 per 1,000 in the Greater London Council area (Spain, 1970). There is general agreement that about half the children will survive to school age and in January, 1971, spina bifida children comprised, after the cerebral-palsied, the second largest group (1,467) of physically handicapped children in special schools (DES, 1972) with a sizeable number also in ordinary schools.

Spina bifida is due to a congenital malformation of the spinal cord, the immediate coverings of the cord and the backbone. It is of two main types. The first, spina bifida meningocele, has few serious consequences. In the second, spina bifida myelomeningocele, the imperfectly formed spinal cord reaches the surface and is exposed to injury and infection while the nerve centres controlling the leg muscles and the lower bowel and bladder may be damaged, with resultant paralysis and incontinence.

It is, however, with hydrocephalus and its associated cognitive disorders that this review is primarily concerned. In hydrocephalus there is a blockage of the free flow of fluid round the brain, this being, in spina bifida children, usually associated with a malformation of the cerebellum (the Arnold-Chiari malformation). The build-up of fluid results in an enlargement of the head, or, when the bony structure cannot extend at a sufficient rate, pressure on or damage to the brain itself. Since 1958 it has become increasingly common practice (where hydrocephalus is present or suspected and does not show early spontaneous arrest) to insert a valve mechanism (usually the Spitz-Holter or Pudenz-Heyer valve) into the head. This drains the excess fluid from the lateral ventrices into a silicone pump, then it is pumped through a catheter into the venous system and is ultimately re-absorbed by the body. It is well established that insertion of the valve prevents stretching and thinning out of the white matter of the brain.

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GENERAL INTELLECTUAL DEVELOPMENT

Until recently most studies of these children were concerned with intellectual development in rather a 'global' sense. The first studies were of children whose spina bifida and hydrocephalus was untreated. Laurence and Tew (1967), for example, have followed up 65 survivors from the 425 cases of spina bifida born in South Wales between 1956 and 1962. Children with meningoceles showed little intellectual or physical impairment, but roughly 70 per cent of those with myelomeningoceles or encephaloceles (where the defect is at the back of the skull) had hydrocephalus and moderate or severe physical handicaps. Test results on the Griffiths or Merrill-Palmer gave a mean IQ of 86, but scores for the hydrocephalic children were not shown separately. Fifty-eight of the children are still alive, and recent findings (Tew and Laurence, 1972) show little essential change in intelligence test scores, the mean IQ of the group with myelomeningocele being 89 on the Wechsler Intelligence Scale (verbal IQ 94, performance IQ 85). 37·5 per cent of the group were between one and four years retarded in reading and 78 per cent more than a year retarded in arithmetic.

Studies of children in whom the hydrocephalus has, where necessary, been surgically arrested include those of Burns (1967) in Liverpool, Badell-Ribera, Shulman and Paddock (1966) and Diller, Gordon, Swinyard and Kastner (1969) in the US, Lorber (1971) in Sheffield, Tew (1971) in South Wales and Spain (1969, 1970, 1972) in the GLC area, many of these being on-going studies.

Of most interest are those in which the performance of spina bifida children with and without hydrocephalus is compared. Badell-Ribera *et al.* (1966) looked at 75 spina bifida children aged 5–12, 47 (62 per cent) of whom had non-progressive hydrocephalus The performance of the hydrocephalic and non-hydrocephalic children (Table 1) on the verbal and performance scales of the Wechsler test was compared.

TABLE 1

COMPARISON OF HYDROCEPHALIC (H) AND NON-HYDROCEPHALIC (Non-H) SUB-GROUPS ON THE WECHSLER TEST SCALE (from Badell-Ribera *et al.*, 1966).

	Verbal Means			Performance Means			Full-Scale Means		
	H	Non-H	P	H	Non-H	P	H	Non-H	P
Total	94	111	·0006	81	106	·00006	87	109	·00006

Of the most interest are, firstly, the lower scores of the hydrocephalic children and, secondly, the difference between the verbal and performance means of the hydrocephalic group, their verbal scores being within the average range, but their performance scores rather low.

These authors also looked at the relationship of intelligence and severity of handicap. In Table 2, category I represents the greatest, and V the least degree of physical handicap.

TABLE 2

COMPARISON OF HYDROCEPHALICS AND NON-HYDROCEPHALICS DIVIDED INTO HIGH AND LOW DISABILITY GROUPS (Badell-Ribera *et al.*, 1966).

	Verbal Means		Performance Means		Full-Scale Means	
Groups	H	Non-H	H	Non-H	H	Non-H
I, II, III ..	91	117	79	109	84	114
IV, V	104	109	89	105	97	107
P	·03	NS	·04	NS	·03	NS

Here the main point is that children in the severely disabled groups achieve significantly lower scores than the less disabled only when there is a history of hydrocephalus. Diller *et al.* (1969) also note great discrepancies in performance between children with and without hydrocephalus. The former were behind a group with spina bifida only and a group with amputations by 18 months in reading and 30 months in arithmetic.

In Sheffield, Lorber (1971) has been studying the intellectual development of an unselected series of spina bifida children born between 1959–1963. Again, intellectual level was investigated in relation to the presence or absence of hydrocephalus as well as to the degree of physical handicap. The children have been repeatedly tested on the full-scale Terman-Merrill since 5 years of age and Lorber reports that individual results do not vary within the margin of error of the tests used. The mean IQ of the 31 children without hydrocephalus and and the 28 whose moderate hydrocephalus required no treatment was the same (87, the range being from 50–129) and Lorber suggests that "unoperated hydrocephalus of moderate degree is fully compatible with normal intelligence." whereas the mean IQ of those who had hydrocephalus and a valve was only 75 (range=10–124). The distribution of scores is shown in Table 3.

TABLE 3

INTELLIGENCE ASSESSMENT : 1959—1963 SERIES (from Lorber, 1971).

	No Hydrocephalus (31) or Hydrocephalus but No Valve (28)	Hydrocephalus With Valve
IQ	N=59 %	N=75 %
100+	31	19
80–99	52	33
60–79	12	30
<60	5	18
Total	100	100

Lorber found that those with the most serious degree of ventricular dilatation generally gave the poorest IQ scores: of the 28 with severe hydrocephalus only 12 (8 per cent) had an IQ of 80+. 83 per cent of the hydrocephalics suffered from lack of sphincter control and from paralysis of a varying degree, and there was some evidence of an association between intelligence and severity of physical handicap, 93 per cent of those with IQs below 80 being impaired in bladder function and mobility and only 77 per cent of those with an IQ of 80+.

Lorber groups the children into five categories taking into account both severity of handicap and IQ, and Table 4 shows the size of each category and the proportion of hydrocephalic children in each.

TABLE 4

QUALITY OF SURVIVORS (from Lorber, 1971).

Category	NoHydro-cephalus	Hydro-cephalus, No Valve	Hydro-cephalus, Valve	Total	% of Survivors
1. No handicap	3	1	–	4	3
2. Moderate handicap	9	6	5	20	15
3 Severe handicap, IQ 80+ ..	15	15	36	66	49
4. Severe handicap, IQ 61–79..	2	5	21	28	21
5. Extreme handicap, IQ <60	2	1	13	16	12
All Alive	31	28	75	134	100

The largest category (3) comprises those with a combination of severe physical handicap and an IQ of 80+, these constituting roughly half of survivors. Approximately 54 per cent of these have hydrocephalus and a valve, while another 23 per cent have hydrocephalus but no valve, and in terms of numbers alone it seems that research concentrated on this particular group would be well worth while.

Finally, two more on-going studies must be mentioned here. One (Tew, 1971) includes 59 children with spina bifida and hydrocephalus born in South Wales between 1964 and 1966. At 5½ and at 7 years each child is given a battery of tests which investigate general intellectual development, language development, attainment in reading and arithmetic, and social/emotional adjustment.

In the GLC area a comprehensive survey is being carried out by Spain (1969, 1970). It includes (*a*) a prevalence study (600 cases have been traced), (*b*) an incidence study (this being estimated as approximately 1·5 per 1,000, producing about 200 children in the GLC area each year of whom probably 90–100 will survive to school-age) and (*c*) a follow-up study of children born with spina bifida between April, 1967, and March, 1969.

Initially, 151 ' true spina bifidas ' (children with a purely spinal defect) and 10 encephaloceles were assessed at about the time of their first birthday. The group was divided according to whether or not a valve had been inserted, although, as Spain points out, " the number with or without a valve cannot be interpreted as being exactly equivalent to those with or without early symptoms of hydrocephalus." Most children showing serious signs of hydrocephalus received very early surgical treatment. Findings on the Griffiths Mental Development Test showed that the prognosis for children needing surgical treatment for hydrocephalus was poor relative to those not needing valves. When the children were re-assessed at 3 years old (Spain, 1972) on two scales from the Griffiths and two from the Reynell Developmental Language Scales, those with valves again had lower mean scores on all tests than those without and only one-third of the children with valves appeared to be developing normally.

VERBAL ABILITY AND SHORT-TERM VERBAL MEMORY

One aspect of the behaviour of spina bifida children which has intrigued clinicians, teachers and parents has been their apparently superior verbal ability. The discrepancy between verbal and performance scores was noted by Badell-Ribera *et al.* (1966) while Laurence and Coates (1967) also note that verbal ability was generally superior to general intellectual level as measured by the Stanford Binet and conclude that " a vocabulary score may give a misleadingly optimistic indication of such a child's educability." Spain (1972) on the other hand, found that 3-year-old children with valves who had below average performance scores " also tended to have poor verbal scores."

The term ' cocktail-party syndrome ' was first applied to hydrocephalic children by Hadenius and his colleagues (1962), and gained wide popularity. They noted in six of the 23 children who were given detailed examinations the peculiar contrast between " a good ability to learn words and talking without knowing what they are talking about. They love to chatter but think illogically." This is in line with Spain's finding (1972) that the children with valves " showed a characteristic pattern for language expression, with good syntax and vocabulary scores, but poor ability to use language expressively." Other writers such as Matson (1961, p. 450) have noted that though hydrocephalic children appeared unimpaired in their ability to " talk, sing, memorise and be cute " a discouragingly high percentage gradually stopped advancing. Tew and Laurence (1972) found evidence of the cocktail-party syndrome in 28 per cent of their sample. They thought that it was " a certain indication of below average if not subnormal intelligence " and also comment on the fact that it is shown more often by girls than by boys.

Clinical observations made by Ingram and Naughton (1962) on children with hydrocephalus associated with cerebral palsy were somewhat similar. They found that in eight out of the 10 cases they assessed vocabulary level was above general intellectual level and during the neurological examination the words ' facile ' ' uninhibited ' and ' cheeky ' were used to describe the behaviour of 10 out of 16 cases, nine being also described as ' chatterboxes,' ' excessively talkative ' and ' bletherers.'

In a study by Diller, Paddock, Badell-Ribera and Swinyard (1966) the verbal behaviour of 32 children with spina bifida myelomeningocele was rated by each of four observers, the children then being classed as ' normoverbal ' (showing normal verbal behaviour) or ' dysverbal ' (i.e. hyperverbal) or receiving an equivocal rating. The findings for 5 to 11-year-olds as they relate to the presence of hydrocephalus are given in Table 5.

TABLE 5

VERBAL BEHAVIOUR IN SPINA BIFIDA CHILDREN WITH AND WITHOUT HYDROCEPHALUS.

Classification	Hydrocephalus	No Hydrocephalus
Dysverbal	11	0
Normoverbal	5	5

All the dysverbal children were hydrocephalics. The main characteristics of their verbal behaviour were that it occurred in socially stressful situations, that the children tended to guess rather than say " I don't know " and that the verbal behaviour was deviant not in that the child talked more but in that he talked irrelevantly. Other findings of interest were that more neurological abnormalities were found in the dysverbal children, that the aberrant verbal behaviour tended to disappear in adolescence, that the parents of these children tended to be more rejecting and that the dysverbal children were more severely handicapped and spent more time with adults. The authors suggest that neurological damage, motor impairment and parental reactions interact in producing dysverbal behaviour and that it is due basically to a failure in the inhibition of irrelevant responses.

Fleming (1968) also looked at the verbal behaviour of a small group of 11 hydrocephalic children (IQs 73–110 median 94) and a matched group of controls. In this case the hydrocephalus was not associated with spina bifida although a few children were mildly physically handicapped. To obtain language samples Fleming used the 10 pictures from Bellak's Children's Apperception Test and the responses were sorted into varying descriptive categories such as direct, abstract, conversational, etc. While the two groups were essentially equivalent on quantitative measures of verbal output, Fleming's clinical impression was that five of the 11 hydrocephalics were verbose outside the period devoted to the task, showing " verbal spontaneity, social aggressiveness, and inappropriateness or irrepressibility of their incidental commentary on the test procedures or the investigator."

On the task itself they appeared to " have difficulty in responding in a consistent and meaningful manner to a specified topic," while " many appeared to seek distraction from the required task of picture description but attempted to maintain the flow of language and the conversational relationship. In other words they were not so much distractible in the passive sense but would actively seek out other topics from the environmental surroundings." Overall she felt that her findings supported the idea that hydrocephalic children may often appear bright on the basis of verbal or social behaviour, this brightness not being confirmed by academic performance.

Hyperverbal behaviour is most likely to be shown in an unstructured situation, and Swisher and Pinsker (1971) have investigated both the quantity and quality of verbal output in an informal conversational setting. Their subjects were 11 children with spina bifida and hydrocephalus (age range 3·2—7·10 years, mean IQ 88, range 65–106) who were considered by clinicians to be hyperverbal, while the controls were limb-deficient children matched for age and history of hospitalisation. The hydrocephalic children had a significantly greater output of words and of sentences and initiated more conversation. They also used more bizarre or inappropriate language than the controls, although this tendency decreased with age. Their profile on the Illinois Test of Psycholinguistic Abilities (ITPA) reflected the superficiality of their output, the only tests on which they scored close to the controls being those dealing with the automatic levels of oral language.

In none of these studies was short-term memory ability specifically considered. Findings such as those of Purkhiser (1965) who reported that hydrocephalic children were superior to non-hydrocephalics on a digit repetition task led Parsons (1969) to investigate short-term verbal memory in hydrocephalics, in particular where more connective verbal material (rather than random digits) was involved. Nine sequences of 15 words each were presented for free recall. The first sequence was a simple sentence: in the following sequences normal word order was progressively broken down, the words in the final sequence being in random order. The test was given to 71 children aged 6 to 8-years-old comprising four groups: (*a*) those with congenital hydrocephalus but no physical handicap (mean IQ 100), (*b*) those with spina bifida (resulting in paraplegia and/or incontinence) and congenital hydrocephalus (mean IQ 91), (*c*) those with spina bifida and a physical handicap but no hydrocephalus (mean IQ 98), and (*d*) those who were under hospital care but behaviourally normal mean IQ 100). All the hydrocephalic children had moderate to severe ventricular distension, with valves where required.

The word sequences were read out one at a time and immediate recall was required; when the subject failed to recall a single word from a sequence the test was discontinued. The score was the total number of words recalled regardless of order (median score, 53 words). No significant differences were found between the groups and none of the hydrocephalic children showed outstanding verbal performance. Parsons suggests that short-term verbal memory in hydrocephalics does not differ significantly from that of non-hydrocephalics and only appears particularly good in relation to their intellectual weaknesses in other areas.

This finding is perfectly compatible with the suggestions of Diller *et al.* (1966) concerning the children's inability to inhibit irrelevant responses. A possible explanation is that the verbal behaviour of this group has been greatly reinforced by parents and others and that this has helped in creating the erroneous impression that these children have superior ability in this sphere.

SPECIFIC COGNITIVE DEFICITS

Three areas will be considered: (i) visuo-spatial perception; (ii) tactile perception; (iii) visuo-motor ability.

(i) *Visuo-Spatial Perception.*

A number of studies, in particular those where verbal and performance scores were considered separately, have suggested there might be specific impairment of perceptual and spatial abilities in hydrocephalic children, but little research has been done in this area with the exception of that of Miller and Sethi (1971a, 1971b, 1971c). During 1969—1970 these authors carried out a series of experiments with 16 children aged 5–15 who had infantile hydrocephalus with or without spina bifida (unfortunately they do not distinguish between the two groups). Most of the children had IQs in the range 70–100; the majority were in special schools for the physically handicapped but a few were in ordinary schools. The controls who were neurologically normal children in ordinary schools were matched for chronological age and sex.

In experiments I–III (Miller and Sethi, 1971a) the authors were concerned with the perception of visuo-spatial relationships. In experiment I the Bender Gestalt Test and the Frostig Developmental Test of Visual Perception were given, the results confirming that children with hydrocephalus have extremely poor visuo-spatial perception especially as regards figure-ground discrimination.

Experiment II examined visual perception in a situation where two possibly contaminating factors were avoided, these being poor motor co-ordination, and verbal encoding of stimuli. The task involved the discrimination of tachistoscopically presented Hindi letters which were too complex to be encoded verbally and therefore, it was assumed, would be encoded as spatial configurations. Again, the hydrocephalics' performance was significantly poorer than that of the controls.

Experiment III was concerned with figure-ground discrimination. A card-sorting task which made use of information theory allowed stimulus complexity to be manipulated in a quantifiable manner. The findings suggested that the hydrocephalic children were much less able to ignore irrelevant background material and that the suggested figure-ground difficulty was not an artefact of stimulus complexity.

(ii) *Tactile Perception.*

In a fourth experiment (Miller and Sethi, 1971b) the authors turned to the tactile modality. They also hypothesised that the stretching of the corpus callosum, which has been reported to occur in hydrocephalics, might result in " an attenuated form of the disturbances found in ' split brain ' subjects in whom the corpus callosum has been sectioned." The children had to match tactile stimuli with either the same hand that felt the original stimulus (' uncrossed ' condition) or with the other hand (' crossed ' condition). Since the ' crossed ' condition necessitates the interhemispheric transfer of information, it was suggested that performance under this condition would be poorer than in the ' uncrossed ' condition if the corpus callosum was not functionally intact. The authors found that the hydrocephalic children were specifically impaired in the perception of tactile stimuli and that the poorer performance in the ' crossed ' condition did suggest a partial ' split brain ' effect, which might also explain the mild degree of dyspraxia seen in these children.

(iii) *Visuo-Motor and Motor Impairment.*

In her report of findings on the Griffiths Scale with the London sample, Spain (1970) notes that when the results on the sub-scales are examined, the performance of the group of spina bifida children with valves on Scale D (eye-hand co-ordination) differs from their performance on other scales not involving a locomotor component and compared with children without valves. In children of 2 and 3-years-old the deficit was even more noticeable, the children scoring badly on such tasks as bead threading, use of a pencil or scissors, or building a tower of bricks. Spain thinks that this "consistent finding" is " unlikely to be due entirely to visual defects." If no such defect can be found it " may imply some kind of cortical or brain-stem damage, specifically affecting the finer hand movements or perception of shapes."

No firm conclusions can be drawn from this evidence since the children were very young but Miller and Sethi (1971a) report two interesting experiments on motor behaviour with the group of children already described. One experiment showed that hydrocephalic children were ' grossly impaired ' in manual speed as compared with normals. The second utilised a motor task in which the subjects' movements could be separated into the components of (*a*) motor speed, (*b*) central decision processes. The authors found impairment in " manual dexterity was due almost entirely to the motor component and not to decision-making processes in which there was no significant difference between the hydrocephalics and the normals."

Miller and Sethi's studies are important both in confirming on an experimental basis the existence of specific deficits which hitherto only clinical observations had implied, and in suggesting possible lines of research. Unfortunately, their sample was a very small one and they do not differentiate between different groups of hydrocephalics, in particular those children with and without spina bifida. Among the former, hydrocephalus results from the Arnold-Chiari malformation ; as this affects the cerebellum, poor eye-hand co-ordination and deficits in other tasks with a motor component can be expected which is not necessarily the case in hydrocephalics whose disorders have a different aetiology. Other weaknesses in the study include the wide range of intelligence (70–100) the wide age range (5–15) and the fact that severity of physical handicap in general, and visual defects in particular, do not appear to have been controlled. However, the authors have succeeded in demonstrating not only that substantial 'hidden' deficits distinguish hydrocephalics from normal children, but also in taking us further than have the large-scale studies towards an understanding of the specific nature of such deficits.

CONCLUSIONS AND IMPLICATIONS FOR EDUCATION AND RESEARCH

(1) *Epidemiological Data*: Epidemiological data suggest that spina bifida children are probably now the largest physically handicapped group in Britain after the cerebral-palsied.

(2) *Incidence of Hydrocephalus*: Of the spina bifida survivors, between 70 and 80 per cent are likely to have surgically arrested hydrocephalus, while the remainder are probably fairly evenly divided between those who have no hydrocephalus, and those whose hydrocephalus was so mild that surgical intervention was not necessary. From the research viewpoint it is important to note that the presence or absence of a valve cannot always be equated with the presence or absence of hydrocephalus and that other criteria must be used.

(3) *Physical Handicaps*: The majority of children with hydrocephalus and a valve are also likely to have moderate to severe impairments as regards both bladder function and mobility, and it is difficult to estimate the extent to which cognitive deficits are related to the effect of the physical handicap rather than to the effects of hydrocephalus.

(4) *Intelligence and Educability*: There can be no doubt about the educability of the children. Tizard (1968), reviewing various surveys, concludes that "substantial numbers of educable children with myelomeningocele survive to school age and the task of educating them is one that can be successfully tackled." Until comparatively recently, however, research into intellectual development was largely confined to the obtaining of 'global' IQ or DQ scores most often from the Merrill-Palmer, or the Stanford-Binet test, or the Griffiths Scales, which provided little information about specific learning difficulties.

It was also difficult to make direct comparisons between the findings in different studies since (*a*) it was not always clear which tests had been used ;

(*b*) the ages of the subjects differed markedly; (*c*) many studies used ' above 80 ' as the criteria of ' normality ' while for others it was ' above 85 ', those below sometimes being lumped together in a range which might go down to 50; (*d*) children with and without hydrocephalus were not always differentiated. Most studies, however, suggest that the IQ scores of a substantial proportion of children with spina bifida and hydrocephalus fall within the range 70–90, with verbal scores generally superior to performance scores. Educationally and administratively the IQ range 70–90 is a most crucial one since it is a borderline zone separating the ' normal ' from the ' ESN ' groups. While in some areas the type of school placement maybe dictated largely by physical considerations, in others special arrangements may be available in ordinary schools for children with quite severe physical handicaps, and intellectual level may be of paramount importance. Because these children, on the basis of a global IQ, appear to be ' borderline cases ' for ordinary schools it is particularly important that the assessment of their abilities should be a very thorough one.

(5) *Specific Learning Disabilities*: Most attention must, therefore, be paid to the sub-scales of the tests used and in particular too great a value should not be placed on verbal ability alone as this may be misleading. Often a varied battery of tests designed to look at specific abilities will be needed. Although comparatively little is at present known about the perceptual or visuo-motor difficulties of the children, work by Spain (1970) suggests that visuo-motor difficulties may be important, and marked visuo-spatial and tactile deficits were also found by Miller and Sethi (1971a, 1971b). While this review has barely touched on attentional deficits, clinical and classroom observations suggest that poor concentration is often a marked feature of the behaviour of these children, and this is another area in which research is clearly needed.

Overall it is true to say that we still know very little about the cognitive deficits of spina bifida children with arrested hydrocephalus and even less about their underlying mechanisms, nor do we know how such difficulties may interact with the severity of the physical handicap. There is, however, increasing evidence that a number of specific deficits are present, and studies of attainment level (for example, Diller *et al.*, 1969; Tew and Laurence, 1972; Anderson, 1973) also suggest that factors such as school absence and hospitalisation are not sufficient to explain the retardation in reading and even more in arithmetic often found in these children.

(6) *Implications for School Placement*: Much of the research above has been stimulated by the need to plan for the future school placement of this increasingly large group. Until more is known, however, above the specific learning deficits of the children, the whole question of placement (already complicated by the children's medical needs and by the fact that the services provided by local education authorities differ so widely) will remain confused. On the one hand, a number of psychologists, educationists and others may feel that some of the children in this group are ' under-functioning ' in the special schools; on the other, it is possible that many children have specific cognitive deficits which will make it difficult for them to hold their own in ordinary schools without specialised extra help (which is, at present, rarely available) even when suitable arrangements are made for their medical care, and even though they may benefit socially.

Studies of physically handicapped children in ordinary schools (Laurence, 1971; Anderson, 1973) show clearly that adequate information about the children's educational needs and advice about how to cope with these often never reaches the ordinary school. As Laurence (1971) puts it, "somewhere between the hospital consultant, the educational psychologist, the school medical officer and the school, vital information regarding the children's individual needs is buried in files . . .Once he has been admitted to an (ordinary) primary school, the spina bifida child seems to be forgotten to an extent which does not happen in a special school," even though his social and emotional needs are adequately catered for.

The major implications of this review must then be two-fold. On the one hand, more information about specific cognitive deficits in children with spina bifida and hydrocephalus must be provided by research. On the other, such research findings as well as the results of individual assessments must be made available to the school heads and class-teachers who are actually working with spina bifida children in ordinary and special schools. The colleges of education could also do more to prepare teachers to meet the special needs of this group. If decisions about the planning of additional services, about school placements and about type of remedial programmes needed are to be made on a rational rather than an intuitive or expedient basis, then it is essential, firstly, that research in this area continues and, secondly, that the results are made known to those who can most benefit from them.

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VALIDATION OF THE MEHRABIAN NEED FOR ACHIEVEMENT SCALE WITH COLLEGE OF EDUCATION STUDENTS

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SUMMARY. A sample of 520 student teachers (344 females and 176 males) in eight colleges of education, completed an anglicised version of the Mehrabian need for achievement scale, a questionnaire measure in parallel male and female forms, together with other personality and attitudinal schedules. In four separate validation studies the Mehrabian scale was found to differentiate between students in terms of their self-images, their intellectual achievement responsibility, and their occupational aspirations. The Mehrabian scale is an objectively-scorable, easily-administered measure of n'ach against which performance criteria can be established. Its use in future studies of student motivation is recommended.

INTRODUCTION

THIS paper reports a series of validation studies in connection with the Mehrabian need for achievement scale (Mehrabian, 1968, 1969), an instrument in questionnaire form, designed to assess need for achievement on the basis of expressed preferences for wide ranges of behaviour. The studies have been carried out with large samples of male and female college of education students. Given the prime importance of motivation both to academic learning and to professional socialisation, the Mehrabian scale, in its separate male and female forms, provides a useful tool to the researcher concerned with personal correlates of student teachers' attainment and performance.

Need for achievement (n'ach) is said to result from the reinforcement of successful performances in infant activities that are achievement-related (McClelland *et al.*, 1953). Successive reinforcement results in the development of a motivation for high achievement which facilitates success in future relevant activities (Robinson, 1964).

N'ach is commonly measured by means of projective-type instruments such as the Thematic Apperception Test (TAT) developed by McClelland and his associates. There are, however, several disadvantages in the use of projective-type measures. They are not only time-consuming to administer, but they require a considerable degree of training in their scoring and they are lacking in validity and reliability criteria (Klinger, 1966).

Although there are some disadvantages in the use of questionnaire measures of n'ach such as the Edwards Personal Preference Schedule (Edwards, 1954), a number of objectively-scorable, easily administered n'ach questionnaires have recently been developed (Mehrabian, 1968, 1969; Hermans, 1969, 1970). They hold out the possibility that simpler measures of n'ach can be produced for which measures of validity against performance criteria can be established. The Mehrabian scale is unique in that it provides parallel forms for male and female subjects. Despite the empirical evidence of sex differences in respect of need for achievement (Veroff, *et al.*, 1953; Atkinson, 1958; Lesser, *et al.*, 1963; French and Lesser, 1964; Houts and Entwistle, 1968; Weiner and Kukla, 1970), the Mehrabian scale is the only one known to the authors which takes account of sex differences in its item-by-item construction.

THE MEHRABIAN N'ACH SCALE

The Mehrabian scale consists of 26 items illustrating a range of behaviours that previous studies have shown to be characteristic of high achievers. Respondents are required to indicate the extent of their agreement or disagreement with the items of behaviour, scoring from +4 (very strong agreement) to −4 (very strong disagreement).

With the male version of the Mehrabian scale significant positive correlations have been reported (Mehrabian, 1969) with other measures of achievement motivation (Bass, 1967; Jackson, 1967), and significant negative correlations with neuroticism (Eysenck and Eysenck, 1963) and dogmatism (Rokeach, 1960). Similar though less strong relationships were shown between the female version of the Mehrabian scale and the Bass and Jackson achievement measures. No significant correlations, however, were reported between female n'ach and neuroticism or dogmatism (Mehrabian, 1969).

Discussing differences between the male and female scales Mehrabian suggests that " whereas achievement in males tends to be relatively more determined by self-sufficiency and independence from existing norms, achievement in females seems to be more determined by the acceptance and perpetuation of existing norms rather than the creation of new ones."

Evidence relating to students' self-images, reported in the first validation study below, only partly supports this observation by Mehrabian.

VALIDATION STUDY 1: SELF-IMAGE AND NEED FOR ACHIEVEMENT

An anglicised version of the Mehrabian need for achievement scale* was completed by 520 students (344 females and 176 males) in eight colleges of education in Northern England, together with other personality measures and attitudinal scales. At the same time details of students' school attainment and intended career patterns were elicited. This first validation study was concerned with the direction and strength of the relationships between n'ach and student self-images as reported on a 20-item semantic differential scale (Osgood *et al.*, 1957).

Table 1 shows correlations between n'ach and specific self-images in the total student population.

Table 2, showing the self-image correlates of n'ach in separate male and female samples, only partly supports Mehrabian's suggestion that female as compared with male need for achievement is more likely to be expressed in acceptance of prevailing social norms rather than independence from them.

In the female sample, but not the male, ***cultured***, ***conscientious***, ***consistent*** and ***emotionally stable*** appear more strongly associated with need for achievement than in the male. In both male and female groups, however, ***individualistic*** and ***rebellious*** are associated with n'ach.

In so far as reported self-concepts do reflect students' motivational dispositions, the correlations reported in Tables 1 and 2 provide construct validation of the parallel forms of the Mehrabian n'ach scales.

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* Only two or three minor alterations in wording were made to the original scale.

TABLE 1

SELF-IMAGE CORRELATES OF NEED FOR ACHIEVEMENT IN THE TOTAL STUDENT GROUP (N=520)

Self-image	r
individualistic	·30
ambitious	·25
sure	·23
concerned	·16
rebellious	·15
precise	·15
hard-working	·14
hard	·14
cultured	·13
conscientious	·12
emotionally stable	·10
stubborn	·09
romantic	·08
consistent	·05
smooth	·05
strict and severe	·05
reserved	·04
refined	·04
bossy	·04
warm	·02

TABLE 2

SELF-IMAGE CORRELATES OF NEED FOR ACHIEVEMENT IN MALE AND FEMALE STUDENT GROUPS.

Female (N=344)		Male (N=176)	
Self-image	r	Self-image	r
individualistic	·28	individualistic	·36
ambitious	·25	ambitious	·26
sure	·23	hard-working	·20
cultured	·20	bossy	·20
hard-working	·19	rebellious	·19
conscientious	·16	concerned	·18
concerned	·16	sure	·14
precise	·14	hard	·14
emotionally stable	·14	precise	·13
down to earth	·13	cultured	·08
refined	·13	stubborn	·08
rebellious	·12	smooth	·08
stubborn	·11	conscientious	·07
smooth	·11	erratic	·06
consistent	·10	strict and severe	·05
hard	·09	temperamental	·04
sociable	·08	romantic	·04
strict and severe	·08	reserved	·04
warm	·05	warm	·03
bossy	·04	refined	·02

VALIDATION STUDY 2: EDUCATIONAL ATTITUDES AND NEED FOR ACHIEVEMENT

In two general colleges and one specialist college within the eight participating colleges of education, 236 female students and 68 male students completed three attitudinal measures of Professionalism, Dedication and Progressivism in Education. These scales were developed in the School of Education at Birmingham University in 1967/68 (Univ. of Birmingham, 1967).

Professionalism is measured on a nine-item scale in Likert form, respondents indicating the strength of their agreement or disagreement with statements such as " Length of service is a fair system on which to base teachers' salaries," and "A teacher should be a member of an appropriate professional association in his subject."

The majority of items composing the professionalism scale are concerned with the desirability of membership of subject and professional associations, with the necessity for a professional body to formulate rules of conduct, and the responsibility of professional members to support strike action in the event of salary disputes.

Dedication to Education is a 10-item scale and consists of items to do with working with duller children, attending parents' evenings, and taking on *social* as well as *teacher* roles. Progressivism in Education, an 11-item scale, is intended to elicit attitudes towards the use of new materials and methods in classroom practices and less formal relationships between pupil and teacher. Both the dedication and progressivism scales are similar in form and structure to the measure of professionalism detailed above.

It was hypothesised that within the context of a teacher training course student motivation to achieve would most probably be channelled into the pursuit of academic and professional goals. Elsewhere (Reid and Cohen, 1973) the significant relationship between n'ach and academic goals has been supported in groups of students matched by educational background and academic qualifications. In connection with professional goals, it was hypothesised that the higher the need to achieve the more likely the internalisation of the ' progressive ' ' child-centred ' philosophies of education that underpin college of education professional courses (Taylor, 1969). In brief, a positive correlation was to be expected between need for achievement and attitudinal measures of professionalism, dedication and progressivism. Table 3 shows that the hypothesis was substantially supported. In the male sample, need for achievement was positively correlated with professionalism and progressivism. The correlation between n'ach and dedication although in the predicted direction failed to reach significance level. In the female sample, need for achievement was positively correlated with progressivism and dedication. The correlation between n'ach and professionalism, although in the predicted direction, did not reach an acceptable level of statistical significance.

TABLE 3

CORRELATION COEFFICIENTS BETWEEN EDUCATIONAL ATTITUDES AND NEED FOR ACHIEVEMENT IN MALE AND FEMALE STUDENT TEACHER GROUPS.

Educational attitudes scale	Male (N=68) r	Females (N=236) r
Professionalism	·23	·09
Progressivism	·34	·34
Dedication	·11	·20

VALIDATION STUDY 3: INTELLECTUAL ACHIEVEMENT RESPONSIBILITY AND NEED FOR ACHIEVEMENT

A sample of 216 student teachers (108 males and 108 females) from five colleges of education completed the Mehrabian n'ach scale and a scale of Intellectual Achievement Responsibility (Weiner and Potepan, 1970). This latter measure indicates the readiness of subjects to attribute successful or unsuccessful actions to themselves (ability and/or effort) as opposed to external factors (luck, difficulty of task, etc.). The Weiner and Potepan scale is a modification of an earlier measure developed for use with grade school children (Crandall, *et al.*, 1962). The instrument consists of 28 forced-choice alternative items covering a range of success and failure events. Respondents choose the alternative with which they agree most.

Among American university students, the Mehrabian scale has been found to correlate positively with success attributed to ability and motivation ('*internalised success*') and negatively with failure attributed to ability (Weiner and Potepan, 1970). Similarly, among American high school pupils, those scoring high on need for achievement were also shown to have significantly higher scores on internalised success (Weiner and Kukla, 1970).

Table 4 shows the relations between n'ach and intellectual achievement responsibility in a sample of British student teachers. In general, the correlations are similar in direction to those reported by Weiner and Potepan, that is, positive in respect of the relationship between n'ach and success attributed to ability, motivation, and internalised success, and negative in respect of failure attributed to ability, motivation and internalised failure.

In the British sample, however, only the correlations between n'ach and success attributed to motivation, and n'ach and internalised success are significant in both male and female groups. The negative correlation between n'ach and failure attributed to ability is significant in the male group and the whole group but not in the female.

TABLE 4

CORRELATION COEFFICIENTS BETWEEN NEED FOR ACHIEVEMENT AND INTELLECTUAL ACHIEVEMENT RESPONSIBILITY

Intellectual Achievement Responsibility	Male Sample N=108 r	Female Sample N=108 r	Total Sample N=216 r
Success			
attributed to ability	·04	·12	·11
attributed to motivation	·33	·27	·32
internalised success	·27	·25	·29
Failure			
attributed to ability	—·27	—·09	—·19
attributed to motivation . .	·18	—·09	·04
internalised failure	—·12	—·14	—·14

High and low need for achievement groups were constructed by selecting[*] those students whose n'ach scores were above and below one standard deviation from the mean.

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[*] Since male and female samples differed significantly in their mean n'ach scores (male $\bar{x}=8{\cdot}73$, $\sigma=16{\cdot}59$; female $\bar{x}=1{\cdot}72$, $\sigma=19{\cdot}89$, $t=2{\cdot}82$ $P<{\cdot}01$) high and low n'ach groups were constructed separately for males and females before being combined to give 36 high achievers and 40 low achievers.

Table 5 shows that in the male, female and whole group analyses, high need for achievement groups scored higher on two of the internalised success factors, scores on motivation and internalised success significantly differentiating between high and low n'ach groups. Comparisons on the internalised failure factors present complex findings similar to those reported by Weiner and Kukla (1970).

TABLE 5

COMPARISON OF HIGH AND LOW N'ACH GROUPS ON THE INTELLECTUAL ACHIEVEMENT RESPONSIBILITY SCALE.

Group	N	A+	M+	I+	A—	M—	I—
Female							
High n'ach	18	5·23	4·41	9·64	5·00	3·23	8·23
Low n'ach	18	4·44	2·77	7·22	4·77	4·27	9·04
t		1·46	3·64	3·40	>1	—2·08	—1·43
P		NS	·001	·01	NS	·05	NS
Male							
High n'ach	18	4·44	5·33	9·77	3·50	4·38	7·88
Low n'ach	22	4·45	3·59	8·04	4·77	3·18	7·95
t		>1	4·57	4·11	—2·15	3·33	>1
P		NS	·001	·001	·05	·01	NS
Total Sample							
High n'ach	36	4·82	4·87	9·70	4·25	3·80	8·05
Low n'ach	40	4·44	3·22	7·66	4·77	3·67	8·44
t		1·22	5·89	5·48	—1·40	0·43	—1·02
P		NS	·001	·001	NS	NS	NS

NOTE—A+ =success attributed to ability; M+ =success attributed to motivation; I + [(A+) + (M+)] = internalised success; A— = failure attributed to ability; M— = failure attributed to motivation; I—[(A—) + (M—)] = internalised failure.

VALIDATION STUDY 4: CAREER ASPIRATIONS AND NEED FOR ACHIEVEMENT

Reviewing literature on the relationship between need for achievement and occupational aspirations, Stacey (1969) suggests that high rather than low n'ach tends to be associated with "realistic strivings for upward occupational mobility that is moderately difficult to attain." At the same time, however, Stacey instances research studies (Mahone, 1960; Morris, 1966; Atkinson and Feather, 1966) which have shown very low n'ach to be associated with unrealistically high occupational striving.

Both 'realistic' and 'unrealistic' career correlates of need for achievement can be exampled in data derived from our sample of student teachers. Validation study 4 examines the career aspirations of students grouped by n'ach and by sex.

The total sample of 520 students completed a career aspiration instrument in the form of a grid representing careers in *schools*, *educational administration*, and *higher education*. Each of these career paths was illustrated by what are generally held to be *initial*, *intermediate* and *top-level* career positions arranged along a nine-interval scale. The initial posts (scale position 1) for each of the three career paths were given as *assistant teacher*, *administrative assistant*, and *assistant lecturer*, respectively. Intermediate posts (scale position 5) were depicted as *head of department*, *adviser/organiser*, and *university lecturer* or *senior lecturer in a college of education*. Similarly, top-level posts (scale position 9) were represented by *headteacher*, *director of education*, *professor* or *principal*. Respondents were required to indicate their career aspirations at 25, 35 and 45 years of age.

' Realistic ' career aspirations and n'ach.

Whereas nearly all students saw their early careers in schools there was evidence of differentiation in career paths by 45 years of age. Table 6 compares the mean n'ach scores of students aspiring to *school* careers with those of aspirants of *higher education* positions at 45. It was hypothesised that high need for achievement would be associated with a desire for mobility out of lower status education positions (schools) and into higher status posts (in higher education). The comparison shows the hypothesis to be supported in both the male and the female group analyses.

TABLE 6

MEAN N'ACH SCORES OF MALE AND FEMALE STUDENTS ASPIRING TO SCHOOL AND HIGHER EDUCATION CAREER POSTS.

Career	Male			Female		
	Mean	sd	N	Mean	sd	N
Schools	7·59	16·13	80	—2·09	16·40	194
Higher Education	12·62	16·23	43	9·06	19·33	32

$t=1{\cdot}66$, $P<{\cdot}05$ (one-tailed test) $t=3{\cdot}09$, $P<{\cdot}001$ (one-tailed test)

' Unrealistic ' career aspirations and n'ach.

To test the suggestion that very low need for achievement may be associated with unrealistically high career aspirations at 45 years of age two extreme groups of male students* were formed by taking all those who scored ± one standard deviation from the male mean n'ach score.

Elsewhere (Reid and Cohen, 1973) it has been shown that low n'ach students tend to pursue certificate rather than degree courses in colleges of education. Extreme low n'ach groups, we suspect, are even less likely to be enrolled in B.Ed. programmes. Since a degree is a likely pre-requisite to a career in higher education or administration, the significantly *stronger* aspirations of the very low n'ach students for university/administrative positions at 45 years of age (shown in Table 7) is taken as evidence of their unrealistic appraisals of their future career prospects.

TABLE 7

OCCUPATIONAL ASPIRATIONS AT 45 OF EXTREME N'ACH GROUPS.
(N=58 male students)

Career	High n'ach	Low n'ach
School	15	10
Higher Education and Administration	10	23

$X^2=3{\cdot}97$, $P<{\cdot}05$ (with Yates' correction)

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* Analysis of female students was not possible due to the large number who did not anticipate being professionally involved at 45 years of age.

SUMMARY AND DISCUSSION

This paper has reported four studies in connection with the validation of an anglicised version of the Mehrabian need for achievement scale, a questionnaire measure, in parallel male and female forms, for use with adult samples.

By way of summary, the following validation evidence was presented:

(1) Both males and females identified as high on need for achievement were found to hold self-images ('ambitious,' 'hard-working,' 'individualistic,' etc.) consistent with a desire to succeed professionally and academically.

(2) In both male and female groups need for achievement was positively associated with various measures of intellectual achievement responsibility designed to differentiate between those individuals ready to accept personal responsibility for success or failure and those tending to attribute such success or failure to external factors. Comparisons of extreme high and low n'ach groups in both male and female groups largely confirmed the direction and pattern of differences in intellectual achievement responsibility reported in studies of American high school pupils and university undergraduates.

(3) In both male and female groups, need for achievement was associated with those individuals who aspired to later careers in higher education rather than in schools. As predicted, low n'ach among males was found to be associated with unrealistically high occupational aspirations at 45 years of age.

Lack of support for predicted relationships between need for achievement and personal/attitudinal measures was as follows:

(4) Among females as opposed to males, n'ach was not significantly associated with Professionalism in education whilst among males, as opposed to females, there was a lack of association between Dedication towards education and need for achievement. It is possible that the Professionalism scale tapped a greater predilection on the part of the male student teacher for active as opposed to passive participation in professional associations when compared with his female counterpart. Conversely, the Dedication scale probably found greater acceptance among female students as opposed to males, for both British and American research supports sex differences in student teacher groups in the direction of greater tendermindedness and idealistic 'service' orientations on the part of women teachers (McLeish, 1970; Colombotos, 1963).

(5) Expected relationships between need for achievement and intellectual achievement responsibility were that individuals high on n'ach when compared with those scoring low, would also be higher on internal responsibility for success (I+), higher in attributing failure to lack of motivation (M—), and lower in ascribing failure to lack of ability (A—). Table 5 shows that these expectations are only partly borne out in the data.

In the male sample differences between high and low need for achievement groups in respect of (I+), (M—) and (A—) are all in the expected direction and at an acceptable level of statistical significance. Among females, only the difference between high and low achievers in respect of their mean scores on internal responsibility (I+) is in accord with expectation. Not only on the index attributing failure to lack of ability (A—) is there a non-significant difference between high and low female achievers, but on (M+), ascribing failure to lack of motivation, the significant difference is in the opposite direction to what was predicted. It is among females low on n'ach that there is a greater willingness to see failure as due to a lack of personal effort.

This finding of a lack of correspondence between men and women, which is in line with the literature on the assessment of intellectual achievement responsiblity in male and female groups (Crandall *et al.*, 1962 ; Weiner and Potepàn, 1970), points to the need for further empirical investigations of the relationships between achievement motivation and intellectual achievement responsibility. The validation evidence reported in the first part of this final summary and discussion section is, we believe, sufficiently encouraging to warrant the use of the anglicised Mehrabian n'ach scale in such future studies of student motivation.

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COGNITIVE PREFERENCE ORIENTATIONS IN STUDENTS OF CHEMISTRY

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SUMMARY. A 40-item chemistry-based 'cognitive preference test' was developed and administered to 284 students subsequent to their study of O-level chemistry, in an attempt to identify preferred modes of attending to scientific subject matter. The results allow two major cognitive styles scales to be formulated: the first measures students' 'scientific curiosity,' i.e., their willingness to extend their knowledge of chemistry beyond existing confines; the second scale measures students' orientation towards the 'pure' or 'applied' science side. Cognitive styles were found to vary considerably with academic ability in chemistry: high achievers are strongly inclined towards further learning of the subject and oriented towards the 'pure' science domain Low achievers display the reverse characteristics.

INTRODUCTION

RECENT researches into the multi-dimensionality of learners' cognitive functioning have paid increasing attention to the identification of cognitive styles. These may be defined as characteristic modes in which individuals can attend to information or tasks presented to them, and, as has been suggested by Messick (1970), "promise to provide a more complete and effective characterisation of the student than could be obtained from intellectual tests alone."

The potential value of a clear identification of students' cognitive styles lies in two directions. First, the knowledge of such styles may provide a basis for adjusting instructional strategies to the learning characteristics of individuals. Second, cognitive styles may be seen as parameters, additional to the conventional cognitive and affective measures, to be considered in the assessment of an individual's intellectual performance or in the evaluation of educational processes.

Reference to cognitive styles in the development of educational practices which take cognisance of individual differences, presupposes that these styles are comparatively stable over time and to a large degree independent of the nature of the information presented to the learner. This view, expressed for example by Witkin *et al.* (1967), has been criticised by Glaser (1970) who argues that it is the teacher who directs and disciplines students' thought processes and so influences their cognitive style. Several recent studies in which students' science-based cognitive preferences were examined (Heath, 1964; Atwood, 1967; Marks, 1967) established distinct differences in thinking styles to emerge from different curricular treatments and would, therefore, seem to support Glaser's view, at least with respect to 'discipline-oriented' cognitive styles. This does not preclude the possibility and, indeed, probability that other types of cognitive styles which are 'discipline-free' show a high degree of stability with time.

In the context of science education, interest in the identification and measurement of cognitive styles centres on their potential usefulness for evaluative purposes, not only in relation to curriculum development, but also in order to extend the assessment of individuals beyond the normal achievement tests. As Heath suggested: "The interest is not in whether the student can identify correct or incorrect information, but rather in what he is likely to do with information intellectually. If a goal of instruction is to change the student's intellectual style within some academic subject, a test of such achievement must permit him to demonstrate different styles."

Four different modes have been suggested in which an individual can attend to scientific information. These are :

(*a*) Acceptance of scientific information for its own sake, i.e., without consideration of its implication, application or limitations ;
(*b*) Acceptance of scientific information in view of its usefulness and applicability in a general, social or scientific context ;
(*c*) Acceptance of scientific information because it exemplifies or explains some fundamental scientific principle or relationship ;
(*d*) Critical questioning of scientific information as regards its completeness, general validity or limitations.

These modes, originally proposed by Heath, have formed the basis of several ' cognitive preference tests ' which have aimed at establishing cognitive styles relative to scientific information. The general characteristic of these tests is that each item first presents some limited information or data of a scientific nature and then offers four ' extension statements ' which correspond closely to the above four areas. From these, a student is required to select the one that to him is most satisfying or appealing and, in so doing, he is assumed to display his own ' cognitive preference.' For example, given the information that solid carbon dioxide (' dry ice ') changes directly without melting into gaseous carbon dioxide at −78°C, it may be that the student focuses on the fact that this is a process of sublimation (category a) ; or he may be attracted by the statement that this phenomenon is used for cooling foodstuffs (category b) ; alternatively, he may be interested in knowing that the sublimation is due to the weak intermolecular forces in carbon dioxide (category c), or he may wish to know what other substances undergo sublimation (category d). These alternatives represent distinctly different ways in which the individual can attend to the initial scientific subject matter. His overall cognitive style in the context of science may be deduced from the general response pattern in a cognitive preference test.

Although cognitive preference testing has been successfully employed by Heath and others for the comparative evaluation of several recent science curricula, its potential for identifying students' cognitive styles has so far remained unexplored. That this latter area is of considerable interest follows from the fact that cognitive styles, especially if they are discipline-based, represent variables which, like academic achievement, emerge and develop in the learner through the process of education. The identification and effective measurement of these styles, used in addition to the grades derived from the normal cognitive tests, could lead to a more valid and comprehensive characterisation of students' overall educational attainment than results from academic achievement tests alone.

The present study represents an attempt to determine science-based cognitive preference orientations in students subsequent to the study of chemistry at the GCE Ordinary Level. The instrument used was a new cognitive preference test whose subject-matter content corresponded closely to that of current O-level chemistry curricula. As part of the investigation, the effect of academic achievement in chemistry, as measured by O-level grades, on students' cognitive preference profiles was also examined.

PROCEDURE

(*a*) *The cognitive preference test.*

The four cognitive preference areas originally suggested by Heath were accepted for the present study. A detailed comparative analysis of the subject-matter content of all current O-level chemistry syllabuses was carried out to ensure that all information incorporated in the cognitive preference test fell within the cognitive framework of students after an O-level chemistry course. The information selected for test items and associated responses was scrutinised by an independent panel of experts and judged to be suitable for the test population. In its operational form, the test comprised 40 items covering all major areas of chemistry covered in O-level courses.* A typical item, corresponding to the example discussed in the Introduction was:

> Solid carbon dioxide (' dry ice ') changes directly into carbon dioxide gas without melting at −78°C.
>
> (*a*) The process of a solid turning directly into a gas is called sublimation.
>
> (*b*) The sublimation temperature of carbon dioxide is low because the forces between CO_2 molecules in ' dry ice ' are weak.
>
> (*c*) Solid carbon dioxide is often used for keeping foodstuffs cool.
>
> (*d*) It would be interesting to know how many other substances change from solid to gas without melting.

Option (*a*) is essentially a re-statement of the information in the item stem, and so relates to the first of the cognitive preference areas outlined above. This, for the sake of brevity, will be referred to as the ' recall ' area. Option (*b*) considers a scientific principle; it corresponds to the third of the cognitive preference areas, to be referred to as the ' principles ' area. The second cognitive preference area (' application ') is exemplified by option (*c*), whilst option (*d*) corresponds to the fourth (' critical questioning ') area.

The customary procedure for the response selection in a forced-choice test, which requires only one out of four options to be selected, was abandoned in the present study in favour of a graded rating procedure. In this, students were asked to arrange the options within an item in an order of preference by allotting four votes to the most preferred option, three votes to the next preferred, two votes to the next and one vote to the least preferred response. The advantage of this procedure is that *all* responses appearing in an item contribute to a student's overall cognitive preference profile, unlike in the normal procedure of response selection where rejected options are treated as equally unattractive.

The feasibility of the modified rating procedure was established in a trial administration of the test which also served as a pre-test of the items originally written. The pre-test population consisted of 80 male subjects of age and educational background similar to that of the participants in the main experiment. Items were analysed by calculating the preference index for each response option, using

$$\text{Preference index} = \frac{\Sigma \text{ Score on a particular response}}{\Sigma \text{ Score for all responses in item}}.$$

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* Copies of the Cognitive Preference Test may be obtained on request from one of the authors (R.F.K.).

Items having responses with preference indices outside the range 0·20 to 0·30 were considered to be ' biased ' and not included in the final test.

The reliability of the test was examined by the test-retest procedure, carried out on the pretest population after a time interval of six weeks, and gave the following results :

r_{tt} (recall) = 0·691 ; r_{tt} (application) = 0·855 ;

r_{tt} (principles)=0·804 ; r_{tt} (questioning) = 0·810.

(*b*) *Student Population and Administration.*

The total student population participating in the main experiment consisted of 284 male students drawn from 13 randomly selected grammar and comprehensive schools. All students had previously completed O-level courses in chemistry. Since the GCE Boards under whose auspices the O-level examinations had been taken employ different grading systems, a rationalised grading scale was adopted in the present study to allow the chemical achievement of students from different schools to be compared and classified. Four achievement categories, labelled respectively 4, 3, 2 and 1 in order of decreasing merit, were identified as comprising approximately equal percentile ranges in the rank order of students as determined by the O-level examinations. The distribution of subjects over the four achievement categories is shown in Table 1. It should be noted that category 1 includes students who either failed their O-level examination or received borderline passes.

Administration of the test took place at the beginning of the Spring term, 1971. Copies of the test had previously been sent to the schools and were completed during a normal teaching period, after a brief introductory talk in which the completion procedure was explained to subjects. All students completed the test in a responsible manner : inspection of the answer sheets gave no evidence of ' random ' response selection.

EVALUATION AND RESULTS

Previous users of cognitive preference tests have drawn attention to the ipsative nature of the measures derived from them which imposes certain limitations on their statistical evaluation. Although the usual normative statistical procedures are generally applied to scores obtained from forced-choice tests, caution is required in the interpretation of results. This practice has been followed here.

The means and standard deviations of scores obtained for the four cognitive preference areas are given in Table 1, for the total population and the four subgroups of different academic achievement. Considering first the data obtained for the total population, it is seen that the means are reasonably close to the theoretical value of 100.* This may be taken as evidence that the test had no undue bias for or against any particular cognitive preference area. Also, the large standard deviations indicate high discriminatory properties of the test.

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* This follows from the fact that the total score for the 40-item test is fixed at 400, i e., $\Sigma S_R+\Sigma S_A+\Sigma S_Q+\Sigma S_P = 400$, where S denotes item scores. Equal preferences for all areas covered would give a theoretical mean area score of 100.

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR COGNITIVE PREFERENCE SCORES.

Cognitive Preference Area	Total Sample N=284	Sub-Sample in Achievement Category			
		4 N=58	3 N=103	2 N=71	1 N=52
Recall (R)	94·71 (21·66)	86·47 (23·94)	93·37 (21·80)	98·46 (19·62)	101·42 (17·68)
Application (A)	101·55 (18·12)	95·84 (21·13)	100·24 (18·73)	103·13 (14·79)	108·36 (14·55)
Critical Questioning (Q)	100·31 (14·94)	103·53 (16·16)	102·34 (15·34)	98·30 (13·51)	95·44 (12·80)
Fundamental Principles (P)	103·43 (17·87)	114·16 (17·83)	104·05 (18·06)	100·10 (15·10)	94·77 (14·56)

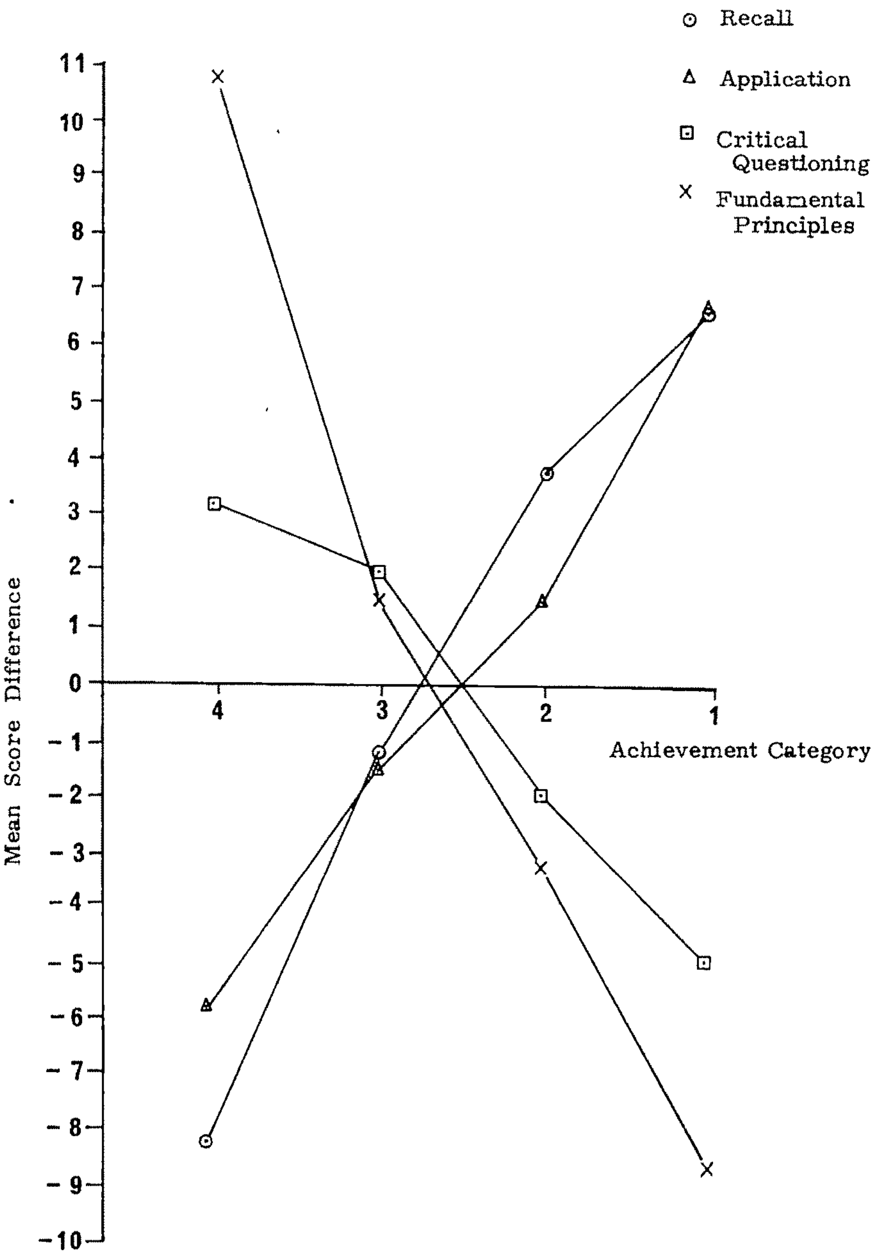
Comparison of the mean scores for students in different achievement categories reveals a strong dependence of cognitive preference orientation on academic achievement. High achieving students exhibit strong preferences for the principles and critical questioning areas, and find relatively little satisfaction from responses relating to recall and application situations. Low achievers display the reverse characteristics. The trends in cognitive preference orientations are clearly demonstrated in Figure 1. One-way analyses of variance on the data in Table 1 showed the observed trends in cognitive preferences with achievement to be significant at the 0·01 level, as is seen from Table 2.

The opposing nature of the trends for the R and A areas and those for the Q and P areas suggests that these two groups of cognitive preference attributes interact strongly. The actual form of the prevailing interactions may be deduced from the inter-area correlation coefficients shown in Table 3. In interpreting the correlation coefficients, it must be realised that the ipsative nature of the cognitive preference test would *per se* result in a low negative correlation between the scores in one area and those in the remaining areas (for a *random* score distribution over all areas, r-values of –0·33 would be expected). Hence, the normal procedure for estimating significance levels cannot be applied to the present correlation coefficients. However, it is seen that two major interdependences exist within the four cognitive preferences areas: 'recall' scores appear highly and negatively correlated with the 'critical questioning' scores, as do 'application' scores with 'principles' scores. The correlations between R and A ,A and Q, and Q and P are weak and suggest no extensive cross-influences to exist between these areas. The remaining negative correlation between R and P is somewhat stronger, but fails to reach the level of the r-values for the R–Q and A–P pairs.

The relationships suggested by the correlational analysis were examined by a factor analysis on the cognitive preference scores. The initial extraction of three principal components showed one of them to account for only 13 per cent of the total variance, and hence the analysis could be restricted to two principal components. Application of the varimax procedure gave the results in Table 4.

FIGURE 1

VARIATION OF COGNITIVE PREFERENCE ORIENTATIONS WITH ACADEMIC ACHIEVEMENT.



Values shown on the ordinate express differences between the mean scores for a given achievement group and the mean scores for the total population

TABLE 2

ONE-WAY ANALYSES OF VARIANCE ON COGNITIVE PREFERENCE SCORES.

Source	S.S.	df	Variance	F-Ratio
(*a*) Recall (R)				
Achievement	7462·9	3	2487·6	5·89
Residual	118313·5	280	422·5	
(*b*) Application (A)				
Achievement	4657·3	3	1552·5	5·18
Residual	83911·4	280	299·7	
(*c*) Critical Questioning (Q)				
Achievement	2543·6	3	847·9	5·38
Residual	44100·3	280	157·5	
(*d*) Fundamental Principles (P)				
Achievement	11404·2	3	3801·4	15·69
Residual	67811·2	280	242·3	

TABLE 3

INTERCORRELATIONS OF SCORES IN COGNITIVE PREFERENCE AREAS.

	(1)	(2)	(3)	(4)
(1) Recall (R)	1·000			
(2) Application (A)	−0·167	1·000		
(3) Critical Questioning (Q)	−0·714	−0·221	1·000	
(4) Fundamental Principles (P)	−0·436	−0·645	0·238	1·000

Significance levels of r-differences : $r_{RQ}-r_{RP}$, $P<0·001$;
$r_{AP}-r_{AQ}$, $P<0·001$.

TABLE 4

VARIMAX ANALYSIS OF COGNITIVE PREFERENCE SCORES

Cognitive Preference Area	Rotated Factor Loadings	
	I	II
Recall (R)	0·969	0·000
Application (A)	−0·100	−0·954
Critical Questioning (Q)	−0·847	0·171
Fundamental Principles (P)	−0·365	0·824
Percentage of Variance	44·97	40·43

Each factor shows strong loadings of opposite sign for two of the cognitive preference areas. Factor I indicates a high inverse relationship to exist between R and Q scores which is independent of A scores and is only slightly affected by P scores. Factor II reveals an analogous situation to obtain for the A–P score pair.

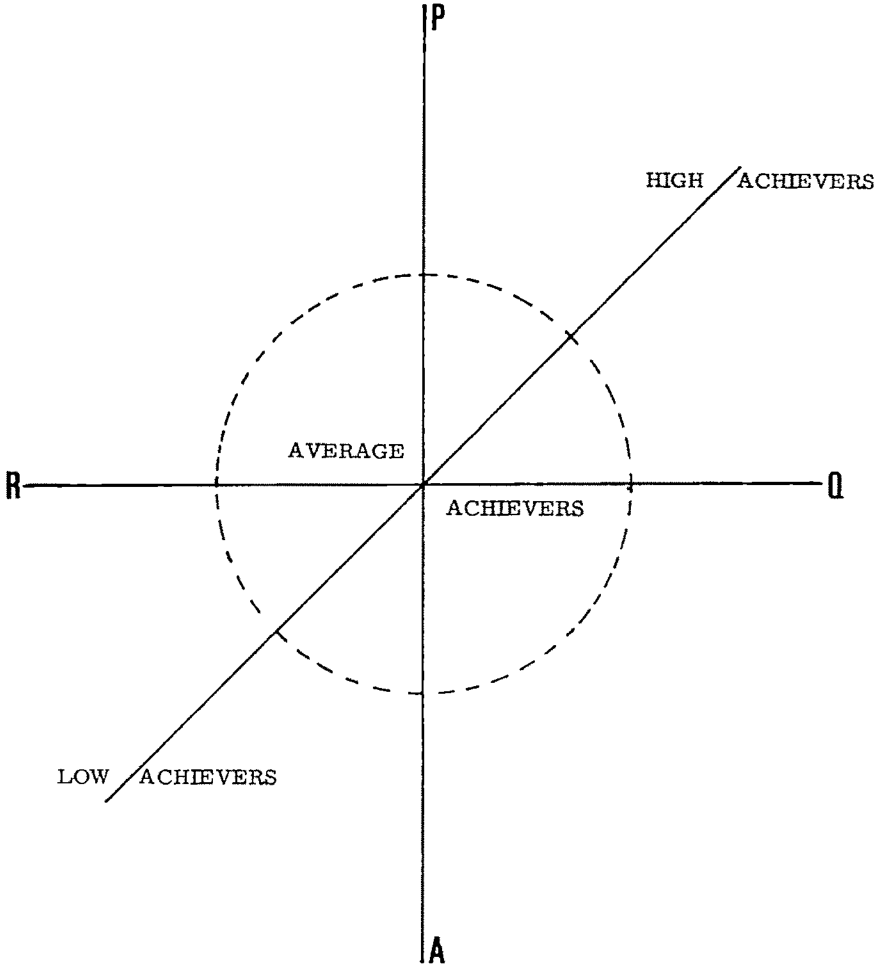
TABLE 5

VALUES OF THE COGNITIVE STYLES MEASURES FOR DIFFERENT ACHIEVEMENT CATEGORIES

	Achievement Category			
	4	3	2	1
ΔS_{QR} (adj) (' Curiosity ' Scale)	11·5	3·4	—5·8	—11·6
ΔS_{PA} (adj) (' Utilisation ' Scale) ...	19·5	5·9	—1·4	—12·0

FIGURE 2

GENERALISED PROFILE OF COGNITIVE STYLES FOR STUDENTS OF DIFFERENT ACADEMIC ACHIEVMENT



(P—fundamental principles ; A—application ; R—recall ; Q—critical questioning.)

It follows from this that cognitive preferences are predominantly oriented along two independent bipolar axes,

(i) Recall ⟷ Critical Questioning,

(ii) Application ⟷ Fundamental Principles,

and therefore it is appropriate to express them by two, instead of the original four measures. Each of these would indicate a student's position on the two bipolar scales. In principle, the differences between Q and R scores and between P and A scores would serve as acceptable measures, but they need to be adjusted relative to the differences between the corresponding population mean scores. Hence:

$$\Delta S_{QR}(\mathrm{adj}) = \Delta S_{QR}(\mathrm{raw}) - \overline{\Delta S}_{QR}$$

$$\Delta S_{PA}(\mathrm{adj}) = \Delta S_{PA}(\mathrm{raw}) - \overline{\Delta S}_{PA},$$

where ΔS denotes score differences and $\overline{\Delta S}$ mean score differences. Values of $\Delta S(\mathrm{adj})$ for the sub-populations in different achievement categories are given in Table 5. It is seen that high achievement in chemistry is associated with high positive values of $\Delta S_{QR}(\mathrm{adj})$ and $\Delta S_{PA}(\mathrm{adj})$, whereas for low achievers these score differences are highly negative. Average achievers lie close to the neutrality point on both bipolar scales. This relationship between cognitive preference orientations and achievement leads to the generalised profile shown in Figure 2.

DISCUSSION

As stated previously, the ipsative nature of the cognitive preference test used in this study imposes certain restrictions on the statistical evaluation of results. However, the strength of the trends and correlations obtained by means of the conventional normative statistical procedure is such that the findings reported in the preceding section may be accepted without undue reservations.

Of immediate interest is the interpretation of the two independent bipolarities revealed by the test which allow students' cognitive preference orientations to be expressed in terms of two measures, indicating their positions on the R–Q and the A–P scale, respectively. The significance of each scale may be elucidated by considering the meaning of the poles involved.

(1) *Recall—Critical Questioning.*

The essential difference between these two cognitive preference areas lies in the mode of responding to scientific information presented in item stems. The main characteristic of all R responses is that they do not extend the initial information ; instead, they merely restate the original information or parts thereof in different ways. In contrast with this, Q responses call implicitly or explicitly for the information to be extended beyond its original confines. A high positive (Q–R) score difference may, therefore, be taken as an indication of a student's willingness and desire to acquire scientific knowledge beyond that already possessed. A high negative (Q–R) score difference, in turn, would suggest an intrinsic satisfaction with knowledge already gained and hence memorised. The quality of ' ambition to learn more ' would be lacking in such a student.

It follows from this that the recall—critical questioning scale provides measure of students' commitment to the learning of science. Since willingness and desire to acquire new knowledge is the essential ingredient of what is often referred to as curiosity in science, the R–Q scale may be labelled ' scientific curiosity ' scale.

(2) *Application—Fundamental Principles.*

Both these cognitive preference areas relate to the utilisation of scientific information, but do so in opposing directions. As indicated previously, the 'application' domain is concerned with the *practical* uses of science in industrial, laboratory and everyday situations, whereas in P-responses the *scientific* uses and consequences of information contained in item stems are explored. The A–P scale may, therefore, be regarded as a scale which measures students' vocational science orientation towards either the 'applied science' or to the 'pure science' side.

Both scales may be regarded as comprising contrasting cognitive styles: the extremes of the R–Q scale express modes of attending to scientific subject matter which may be described as 'passive acquiescence' in and 'active commitment' to the learning of science; whilst those relating to the A–P scale signify the acceptance of scientific knowledge on account of its 'practical value' or 'scientific implications,' respectively. The scales themselves provide a continuum of these contrasting styles.

The cognitive styles of students in different ability groups contrast markedly. High achievers tend to exhibit a high degree of 'scientific curiosity' and in their acceptance of scientific information lean distinctly towards the 'pure science' side. Low achievers lack scientific curiosity and accept science primarily because of the uses that may be derived from it, rather than because of its intrinsic value as a field of intellectual enquiry. Admittedly, these are generalisations which are based on averages, not distributions, and so have little predictive value. Nevertheless, they provide some guide to the relationship between the cognitive outcomes of O-level chemistry courses and qualities which are, strictly speaking, non-cognitive.

The present study, whilst establishing cognitive preference orientations in students subsequent to O-level chemistry courses, leaves unsolved the question of how these orientations develop with age or as the result of instructional influences. Research into this area would seem to be highly desirable if the potentiality of cognitive style measurements is to be realised.

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IMAGERY IN THE LEARNING OF VERBAL DEFINITIONS

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SUMMARY. The purpose of the present study was to determine the effects of self-discovered imagery, experimenter-supplied images, and verbal definitions on the retention of definitions of nouns. Eighty-seven fifth-grade children were randomly assigned to the three conditions and given 16 definitions to learn The children were instructed to read and learn the definition of each word: (1) by discovering an image and drawing a picture of it, or (2) by tracing an illustration of the definition, or (3) by copying the written definition. Recall on a multiple-choice test administered one week after instruction was statistically significantly better ($P < \cdot 05$) for subjects in the imagery-discovered condition than for subjects in the verbal definition condition.

INTRODUCTION

IMAGERY is an important mediator of retention that has implications for facilitating learning in schools. However, much of the evidence regarding imagery (Paivio, 1971) has come from studies involving response-recognition, serial learning, and paired-associate tasks. Often these tasks are only remotely related to the learning tasks encountered in schools. The present experiment was conducted to determine the value of imagery in facilitating long-term retention in a task common in elementary schools, the learning and retention of definitions of nouns.

It was hypothesised that children using self-discovered images would remember more definitions than would children given images by the experimenter. The prediction was that each of these two imagery groups would remember more definitions than a control group given only verbal definitions.

The two hypotheses of this experiment are based upon data from a variety of sources (Bobrow and Bower, 1969; Paivio, 1971, pp. 327-332 and pp. 344-347; Wittrock, 1966) regarding the effects of imagery upon retention or the effects of discovery of verbal mediators upon retention. In his thorough discussion of the effects of imagery upon retention, Paivio states that imagery is centrally important in facilitating long-term retention, at least for adults. Among children, the role of imagery in retention is less well understood (Paivio, 1970; Palermo, 1970; Reese, 1970; Rohwer, 1970). Rohwer (p. 401) states that for older children, imagery is the primary process for storing information, although verbal processes are the primary ones for younger children.

The effects of imagery instructions upon children, with which we are involved in the present experiment, have not often been studied. One notable exception is the study by Taylor *et al.* (1970) demonstrating that imagery instructions facilitate retention of sixth-graders. From these data, we predicted that either self-discovered or experimenter-given images facilitate long-term retention of 10-year-old children more than do verbal definitions.

The second prediction of this study is that self-discovery of mediators produces greater retention than does experimenter-given mediators. Bobrow and Bower (1969) supported this hypothesis using college students and verbal mediators. The extensive, sometimes conflicting, literature on discovery learning (Wittrock, 1966) also lends some support to the second prediction of this study.

One reason self-discovered verbal or imaginal mediators facilitate learning is that they are idiosyncratic, high associative mediators. The semantic processing of these mediators should facilitate constructing a retrieval scheme, such as associating an idiosyncratic image to a word, that is more easily remembered than is a scheme developed by an experimenter. However, there are no data comparing discovered and given images in long-term retention.

METHOD

Subjects.

The subjects for this study were 87 fifth-grade students, the entire fifth-grade population at a Southern California elementary school in Claremont. There were 47 girls and 40 boys. Their mean age was 10·5 years. Based on their scores on the California Test of Mental Maturity, the mean IQ was 105·7 with a standard deviation of 13·5.

Materials.

A list of 18 words (nine high-imagery nouns and nine low-imagery nouns) matched for length, frequency, and meaningfulness were selected from a seventh-grade spelling text (Hanna and Hanna, 1957).*

The index of imagery values of the 18 words is based on the norms reported in the study by Paivio, Yuille, and Madigan (1968), in which subjects rated the imagery value of 925 nouns on a seven-point scale. The words used in the present study were classified as high or low in imagery value when they were respectively above or below the mean for imagery (i) reported by Paivio *et al.* (1968).

Meaningfulness was defined by Paivio *et al.* in terms of the mean number of written associations a subject made in 30 seconds. The overall mean for meaningfulness (*m*) was 5·81. All of the words selected for this study were within one standard deviation of the mean for *m*. Word frequencies were obtained for each of the 18 words from *The Teacher's Word Book of* 30,000 *Words* (Thorndike and Lorge, 1944) and from the *American Heritage Word Frequency Book* (Carroll *et al.*, 1971).

Procedure.

In each of the three classrooms in the study, children were individually randomly assigned to three treatments: (1) self-discovered imagery, (2) imagery-given, and (3) verbal definition or control. All groups received a written booklet containing instructions and one word and its definition per page. The experimenter carefully regulated the amount of time devoted to each page with a stopwatch. All subjects were allowed a minute and a half per word.

The verbal definition or control group was told to learn each definition by reading the words and definitions and writing them repeatedly during the allotted interval. The imagery-given group, or the illustrated condition, received the words, definitions and illustrations. This group was instructed to read each word and its definition, then to write the word and its definition once, and then to trace its picture. If time remained, they were told to repeat this process. The imagery-discovered group received instructions to read each word and its definition, to write them, and then to draw a pictorial representation of the word and its definitions. If there was surplus time, they were asked to repeat the procedure, tracing the original drawing. It was emphasised that the quality of the pictures was not important.

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* The words were: brain, committee, friend, journal, machine, magazine, newspaper, square, village, direction, effort, idea, justice, knowledge, majority, style, trouble, and truth.

All subjects were informed at the outset of the experiment that on a multiple-choice test, to be administered a week later, they would be required to identify the definition of each word with the meaning most like the one given in the booklet.

A three-choice multiple-choice test was given to each child one week later. Each choice for every item was a correct definition of the word. However, only the correct choice for each item paraphrased the meaning presented during learning.* None of the choices was identical to the response learned in the booklet. All definitions in the post-test were taken from the *Webster's Third International Dictionary* (1964).

The instructions specified that the subjects were to mark the answer most similar in meaning to the definition learned one week earlier in the study. This objective test was designed to minimise guessing and to determine those students who retained the definitions previously learned in the experiment.

RESULTS AND DISCUSSION

Items one and two served as examples in each of the three conditions. These items were eliminated from the data analysis, reducing the total number of words to 16. An inspection of the completed booklets revealed that all subjects in each treatment followed the instructions for that treatment to write, trace, or to draw. These data provide assurance that the treatments manipulated the variables under study and that the number of correct responses attained by a given subject on the post-test is a function of the treatment to which he was assigned.

Across the treatment groups retention did not significantly differ for the high and low imagery words. These 18 words were grouped into one test to increase its reliability. When the distribution of post-test scores was plotted by treatment, the control group distribution was positively skewed with a higher variance than either of the imagery groups. To normalise the three distributions, a log transformation of the raw scores was performed. Table 1 lists means and standard deviations for the raw score data. The analysis of data to follow is based on the transgenerated scores.

TABLE 1

NUMBER OF DEFINITIONS RETAINED FOR ONE WEEK.

Treatment	Sentences	Given Images	Discovered Images
Sample Size	27	29	31
Mean	8·0	8·8	9·1
Standard Deviation	3·2	3·0	2·2

NOTE—The total possible score on the retention test was 16. Raw scores are reported in the table. The respective transgenerated means and standard deviations are: Sentences: ·87, ·19; Given Images: ·92, ·16; Discovered Images: ·95; ·11.

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* An example of a post-test item is:

7. journal: (*a*) a diary of everyday happenings; (*b*) a daily newspaper; (*c*) a record of business.

Regarding the three treatments of the study, the major prediction was that the learning and retention of definition of nouns is facilitated most when children discover their own images for the definitions, second most when children are given images (pictures) developed by someone else, and least when children copy the definitions. The appropriate, customary statistical test for evaluating hypotheses, such as the one mentioned above, is an F test for a predicted linear trend among treatments (Winer, 1971, pp. 210-219). This test produced a statistically significant result ($F=4{\cdot}65$, $df=1$ and 84, $P<{\cdot}05$), indicating that, taken as a whole, the obtained rank order of the treatments, and the differences among the three treatment means, are very probably not due to chance. That is, the data support the main hypothesis.

We were also interested in whether each of the two imagery groups would, when taken individually, score statistically significantly higher than the control group. One-tailed t tests (Winer, pp. 201-204) for comparing each of two or more treatment means with a control group mean are designed for this situation. Compared with the control group, the self-discovered imagery condition produced a statistically significant difference ($t=1{\cdot}98$, $P<{\cdot}05$, $df=84$). A similar comparison of the imagery-given group with the control group produced no statistically significant result, although the result approached statistical significance. This second statistical test means that the facilitation of learning is greatest where imagery and self-discovery are combined into one treatment, and less apparent or non-existent when imagery without discovery is used in instruction.

In sum, the results support the major hypothesis of the study. The learning and retention of definitions of nouns was facilitated when 10-year-old children discovered and drew idiosyncratic images to represent nouns and their verbal definitions.

It is interesting to try to explain how self-discovered images may facilitate the learning and retention of verbal definitions. One plausible explanation is that, according to recent neurological and psychological research (Paivio, 1971) the human brain stores information in at least two different modes, imaginal and verbal. As used in this study, imagery allows the child to elaborate a verbal definition into the concrete spatial mode and enhances his associations to the noun and its definition.

Self-discovery of the image may allow the child to relate the definition to his own experience and to develop from it an image of high association value to him. These self-discovered images would then facilitate memory by serving as retrieval cues for the specific definition embodied in the images.

Fortunately, imagery is once again becoming an important subject for educational psychologists to study. The importance of imagery for the development of theory about human cognitive and brain processes has long been appreciated by many educational psychologists. However, the practical significance of imagery has not been often studied nor well understood. The data of this study indicate that imagery, at least when combined with discovery, has practical significance in facilitating the learning of verbal definitions taught in schools to children.

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RESEARCH NOTES

THE EFFECTIVENESS OF A PEABODY LANGUAGE DEVELOPMENT KIT WITH SEVERELY SUBNORMAL CHILDREN

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SUMMARY. Two groups of severely subnormal children were studied, an experimental group of 11, and a control group of 10 children. The experimental group was given daily instruction with Level P of the Peabody Language Development Kits. Both groups were pre-and post-tested on some subtests of the Illinois Test of Psycholinguistic Abilities. After an experimental period of 10 months, the experimental group showed significant gains over the control group on the ITPA subtest scores. Some caution is advised in interpreting these results.

INTRODUCTION

Although it has become increasingly clear to teachers and psychologists that improved procedures are needed to promote an accelerated rate of language development, especially among primary school children, the development of such procedures in a well organised and readily available kit or programme has been slow. The most sophisticated programmes currently available are those developed since 1960 by Professor Lloyd Dunn, University of Illinois, and his associates, and distributed in this country by the National Foundation for Educational Research. For a detailed description of the Peabody Kits readers are referred to the publisher's advertising material (Dunn, Horton and Smith, 1968).

The effectiveness of the kits has been widely studied in the United States of America and generally such studies lend support to the claims of the authors (see Dunn and Mueller, 1967 ; Dunn, Nitzman. Pochanart and Bransky, 1968 ; and Ensminger, 1966).

Although the kits have been available in this country for some time now, similar studies, testing their effectiveness in our culture and schools, have not been widely reported.

It was hypothesised that a language development programme such as the Peabody should help severely subnormal children fulfil their language ' potential ' quicker than they would do in the normal day-to-day work and language experience of school.

THE PRESENT STUDY

Sample of Children.

Two groups of children (an experimental group of 11, and a control group of 10), attending as day pupils in two local education authority schools for the severely subnormal were used in the study. The groups were well matched in terms of intelligence, age-range, language skill and home backgrounds, as were the two schools in terms of design, staff-pupil ratio, provision of material and equipment, day-to-day curriculum and supportive services.

Procedure.

The experimental period lasted from September, 1970, to June, 1971. During this period both groups continued with their normal day-to-day curriculum, the only difference between the groups being that the experimental group was given daily instruction from the Peabody Language Development Kit for half-an-hour each day. Both control and experimental groups were taught collectively for the greater part of their school day.

Both groups were pre-and post-tested on the Illinois Test of Psycholinguistic Abilities within the same week, before and after the experimental period. They had previously been assessed on a Stanford-Binet Intelligence Scale within the same fortnight in July, 1970.

TABLE 1

CHARACTERISTICS OF THE GROUPS AT THE START OF THE EXPERIMENTAL PERIOD.

Group	N	Mean CA	SD	Mean IQ Stanford-Binet	SD
Experimental	11	11 : 4	2 : 2	45	7.5
Control	10	12 : 0	3 : 0	44	7·1

TABLE 2

PRE AND POST TEST SCORES OF BOTH GROUPS ON THE FIVE SUBTESTS OF THE ITPA AND ANALYSIS OF COVARIANCE ON THESE SUBTESTS.

Group	N	Pre-test		Post-test		Analysis of Covariance		
		M	SD	M	SD	F	P	df
1. Aud. Voc. Automatic								
Experimental	11	6·1	4·0	9·7	5·8	3·4	—	18
Control	10	4·7	3·5	6·3	4·9			
2. Visual Decoding								
Experimental	11	8·5	2·6	11·6	2·8	<1	—	18
Control	10	8·6	3·2	12·0	4·5			
3. Motor Encoding								
Experimental	11	6·9	3·5	12·0	2·2	11·9	·01	18
Control	10	10·3	3·1	12·1	3·3			
4. Aud. Voc. Association								
Experimental	11	9·8	4·8	14·0	4·0	<1	—	18
Control	10	10·1	5·6	13·9	5·1			
5. Vocal Encoding								
Experimental	11	7·8	2·8	19·3	3·6	13·9	·01	18
Control	10	8·3	3·9	13·2	5·9			
6. Total of 5 subtest scores								
Experimental	11	39·1	14·0	66·6	14·9	7·3	·05	18
Control	10	42·0	15·8	57·5	18·7			

F (·05)=4·41 F (·01)=8·28

Time and personnel available did not allow all nine subtests of the ITPA to be administered. The five subtests selected (Auditory-Vocal Automatic Test, Visual Decoding Test, Motor Encoding Test, Auditory Vocal Association Test and Vocal Encoding Test) were chosen because they gave a fair reflection of the decoding. encoding, association and automatic areas of language sampled by the whole test, No attempt was made to translate the raw scores obtained into language ages since comparison was to be made in terms of improvements in raw scores only.

Frequent, regular visits to both schools, and familiarity with the staff, regimes and organisation of both schools, indicated that apart from the introduction of the experimental treatment, there was no significant difference between the two schools.

RESULTS

Both groups were pre-and post-tested by the same tester, the investigator. The pre-and post-test results for both groups, and analysis, are set out in Table 2.

An analysis of covariance was used to ensure that the groups were adequately matched at the outset of the experimental period. The lack of significance of the Fx term (Fx=0·17, df=1/19) indicates this to have been the case. Since the two groups began with equivalent performances, the differences in their performances after treatment indicate the differential effectiveness of the treatment.

It can be seen that the experimental group improved differentially on total scores for the five subtests administered from the ITPA. In addition, the effects of the different treatments altered differentially the scores of the two groups on two of the subtests (numbered 3 and 5 in Table 2) while results on subtest numbered 1 in Table 2 approach significance at the ·05 level.

DISCUSSION

The Peabody Language Development Kits were developed as a method of stimulating general oral language and not as a means of stimulating specific language abilities. However, several American studies (Mueller and Dunn, 1967; Ensminger, 1966) indicate that children tend to show greater improvement on auditory vocal association skills (the ability to reason by analogies), visual motor sequencing tasks (the ability to reproduce a sequence of visual stimuli from memory) and vocal encoding tasks (the ability of children to describe simple objects and express simple ideas in words).

This study, then, is consistent with the results of these earlier American studies in that the significant gains of the experimental group are largely due to the very large gains made on two of the subtests sampling two areas of language.

These results are inconsistent with the stated purposes of the Peabody Kit which is to teach all language skills. Dunn and Mueller (1966) advance three hypotheses to explain these findings: (1) inequalities in the educability of the children in the various linguistic skills measured by the ITPA; (2) unequal or inappropriate emphases on the various language functions of the Peabody Kit; or (3) differential sensitivities and reliabilities of the ITPA subtests. It remains for further research to test these hypotheses.

The whole question of unevenness seems at any rate a minor one and, indeed, it is not one that concerns the authors too much either. They themselves point out that " within the broad purpose of stimulating overall language, the activities were designed to emphasise training in thinking and expressing. They do just that." The word ' training ' seems particularly appropriate in the context of this study. Previous investigators comment on the need for "language to be fed in," in particular when teaching severely subnormal children (Jeffree and Cashdan, 1971). The very design and procedures used in the Peabody Kit give tremendous opportunity for ' language to be fed in.' Simple verbal responses are ' fed in ' and ' dragged out ' again quickly and frequently. Such practice is essential to any programme which hopes to help the severely subnormal child.

Two important points must be made here, however, concerning the results of this study. At the time of the pre-testing, the children were not very familiar with the investigator and the scores on the ITPA subtests may be slightly depressed because of this. Similarly, at the time of the post-testing, the investigator and the children in the study were very much at ease with each other, and it may be that the post-tests scoring is spuriously high, and the gains made by both groups artificially inflated. How far this may affect the differential gains obtained it is impossible to say. One criticism that might be levelled is that the use of the ITPA was not an impartial test of the effects of the treatment, since the experimental group was, in a sense, being trained to respond in the treatment to questions and directions which make up a large part of the testing material. This criticism is only partially acceptable, but must be lived with as an 'inherent vice' of the relationship between programmes designed to promote a global skill and tests constructed to sample that skill. At any rate, it can be argued that the programme did not seem to teach acceptable responses to specific items of the testing material, although a wide range of similar items was taught in a more general way.

CONCLUSION

This study lends some weight to the claims of the authors of the Peabody Language Development Kits in suggesting that even over a relatively short experimental period severely subnormal children make substantial improvements in their language ability. This study suggests that the tailoring of individual language problems to individual children is not necessary in all cases, and that granted a certain language development already, severely subnormal children can be taught effectively as a group. Some caution, however, is advocated in interpreting the results.

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THE EFFECT OF READING TUITION ON ACADEMIC ACHIEVEMENT: VOLUNTEERING AND METHODS OF TUITION

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SUMMARY. Volunteers were recruited from an Introduction to Psychology course at an Australian university. Of the 197 students in the sample 108 volunteered for a reading improvement programme. From the group of volunteers 26 were chosen at random to undergo a course of reading improvement using a speed reading projector. A further 27 were similarly chosen for a course on reading improvement but without the pedagogical use of mechanical aids. Both the groups receiving reading tuition improved over their starting rates. The non-projector group had greater speed but not greater comprehension. Neither the fact of volunteering, the non-receiving of tuition nor the form of tuition had an impact on examination performance. It is concluded that volunteering and the receiving and form of reading tuition do not bear upon performance at formal examinations. The presentation of relevant content in a reading improvement course does not enhance academic achievement.

INTRODUCTION

In recent years there has been a heightened interest in reading rates. Among the features which have brought it to wider interest are those of its use by professional persons who need to keep up with extensive reading requirements and the somewhat extravagant claims of some commercial reading improvement services.

There are a number of controversial issues associated with this area of research. The use of mechanical devices, the measurement of reading rate and adequacy of control groups are examples. Such issues are discussed in more detail by Berger (1968).

In a recent article, Witty (1969) asserted that aspirations about reading rate should be more modest than are commonly advertised. With a starting rate of about 270 words per minute the average student might expect to improve by about 75 per cent (to just over 470 words per minute). A related problem is that of comprehension of material. Berger cited a study in which the conclusion was drawn that comprehension depended less upon speed and more upon intelligence, the purpose of the reading, the difficulty level of the material and the opportunities for verification and perception of continuity. The results of an investigation of the Wood Reading Dynamics method by Liddle (1966) showed results which did not substantiate the claim that exceptional rates were obtained without a loss of comprehension.

Carver (1972) maintained that most courses teach one to skim and that an increase in speed is not gained without sacrificing comprehension. The best way to improve reading, he says, is to read.

Reading competence at the starting position has been shown to have little or no influence upon the magnitude of the change that can be expected following tuition. Participants at both ends of the pre-test continuum appeared to gain equally well in reading achievement (Brim, 1968).

In several studies attention has been directed to the question as to whether machinery is necessary or desirable. McLaughlin (1969) has shown that speed readers appear to use their peripheral vision not only to examine the words on either side of each fixation but also to inspect the lines above and below. The use of a projector showing one line at a time prevents the development and exercise of this skill. Paperback scanning sessions in which training was given have been demonstrated to produce a significantly higher gain in reading rate than the use of either tachistoscope, controlled reader, or controlled pacing methods (Berger, 1967). Further confirmation is given by Witty who reports that studies repeatedly show that pacing devices do not produce results superior to those of non-paced tuition.

At least three studies have considered the effect of reading competence on academic performance. Stebens (1968) has demonstrated that participation in a reading improvement programme improved academic performance. The gains were in reading comprehension, in vocabulary and in total reading performance. Reading rates continued to improve over a five semester period but gains in comprehension, although retained, did not improve. Confirmation of this general finding is given by Freer (1969). In that study the marks of students who had been given reading skill improvement training were significantly higher than for a control group.

Mouly (1952) used an experimental group of 155 students who took a remedial reading course for one semester. These were compared with a control group using honour-point ratios for a period of two years for those still in attendance, or for the period of their attendance for the students who had attended at least one full semester. Measures were calculated for both experimental and control groups and adjusted for initial differences in reading and psychological test scores. Only slight differences were found between the adjusted average honour-point ratio of the total for the experimental and control groups. Similarly, the groups were almost identical in drop-out rate semester by semester and in the average number of credits accumulated over the period. However, when only that portion of the experimental group which had successfully completed the remedial reading programme was compared with the control group, significant differences in favour of the former were found. The conclusion was drawn that a remedial reading programme can result in an improvement in academic grades for those students who take the course seriously.

The study being reported here is designed to draw together the following strands: methods of reading tuition, volunteering for reading courses, and the effect of these variables upon examination performance. Both the first and third points have received separate consideration in other studies. What is different in this study is that it brings in a new factor (volunteering) and compares *methods* of reading tuition in relation to academic performance.

METHOD

The sample consisted of 197 university students enrolled for a course ' Introduction to Psychology ' during 1972. All students had passed a prerequisite course ' Introduction to the Behavioural Sciences.'

On initial contact with students it was stated that places were available in a reading improvement course and that much of the content would be relevant to the course they were studying. The reading improvement tuition was to occupy an hour a week for one semester. As a consideration students participating would be excused one of the other specified hours of formal tuition.

Of the 197 students, 108 volunteered to participate in the reading improvement programme. For reasons of experimental design 55 of those volunteering were not included in the reading programme.

The reading improvement consisted of two forms · one form used an EDL Controlled Reader model V–45–P projector; the other form was conventional small group tuition without machinery.

Students undergoing tuition using the projector had specially prepared filmstrips presented at an increasing pace both with and without left-to-right scanning. Both this group, and those who had conventional tuition on how to read, were told of scanning, eye movements, skimming, precis points, etc. Both groups used the same content materials.

To summarise this arrangement, there were four groups for comparison: one which had conventional reading tuition, one which had tuition based upon the EDL reading projector, one which volunteered for reading tuition but did not gain entry and a fourth group of non-volunteers. For all those who volunteered, randomisation was used to determine whether they were selected and to which form of tuition they were assigned.

There were two criterion measures, in addition to reading speed and comprehension; they were the students' mark on the examination (' Introduction to Psychology ') and the mark on the examination for the prerequisite, and cognate, course (' Introduction to the Behavioural Sciences ').

RESULTS

An analysis of variance was carried out on examination performance of all four groups. No significant differences were found on the examination marks for the prerequisite course or the examination marks for the course under consideration.

Of those receiving reading tuition, the projector group improved in speed over the semester by 28·3 per cent whereas the non-projector group improved by 33·0 per cent. This was a significantly greater improvement by the non-projector group over that of the projector group ($F=5{\cdot}934$, $df=1, 51$, $P<{\cdot}01$). No difference was found on comprehension scores between the groups.

To avoid giving the reading tuition groups practice in answering questions on course material, comprehension test passages given during the course were of general content. While the passages ranged over a variety of content areas, an attempt was made to keep them to comparable levels of difficulty. 67 per cent of the increase in reading speed for general material had occurred by the fourth week of tuition. However, at this stage comprehension had dropped significantly ($t=4{\cdot}75$; $df=179$, $P<{\cdot}001$). During the remaining sessions, speed increased a further 23 per cent and comprehension returned to the generally satisfactory pre-test level.

The question also arises as to the possibility that some confounding might have taken place as a result of different initial competence. To examine this, an analysis of covariance was carried out using the mark on the prerequisite course as a covariate with reading speed improvement. No significant differences were found between the two reading tuition groups in their final examination marks ($F=1{\cdot}326$; $df=1, 49$; $P>{\cdot}05$).

CONCLUSIONS

It was the purpose of this paper to examine some linked propositions. These propositions were the role of volunteering for reading tuition courses, the efficacy of different forms of tuition, the extent of reading improvement and the effect of reading improvement on examination performance.

The results showed most clearly that volunteering for reading tuition courses bears no significant relationship to examination performance. Also, that despite the current interest in pedagogical machinery no advantages apparently attach to its use. The group which received the reading tuition without the aid of the projector fared better on speed improvement than the group which did use the projector. The groups were not distinguishable from each other by their ability to comprehend the passages read.

It is noted that both groups receiving reading tuition improved their reading speed by an average of 30·9 per cent, but the group receiving tuition with the EDL projector improved 4·7 per cent less than the group taking ordinary classroom reading tuition.

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A COMPARISON OF DYSLEXICS AND NORMALS IN RECALLING LETTER ARRAYS AFTER BRIEF PRESENTATION

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Summary. The study was designed to examine differences in the performance of dyslexic and normal children in the recall of letter arrays which were presented for varying durations. Thirty-three dyslexic and 33 normal children aged between 8 and 12 years were recruited for the study. The results show significant differences in the level of performance rather than differences in kind of visual information processing and would support the notion of a developmental lag in visual memory.

INTRODUCTION

The recent methodology and techniques associated with the study of human visual information processing provide new avenues for research into the psychology of reading and its disorders (Stanley, 1973; Young and Lindsley, 1970). According to this approach the information contained in a brief visual stimulus is represented in different forms at different times after stimulus offset (Haber, 1969). First, the image is retained in a high-capacity, but short-lived stage referred to as the icon or visual information store. This stage decays rapidly and an encoding process transfers a smaller, more manageable amount of this information into the next stage which is a short-term memory stage. This second stage is more resistant to decay, but of more limited capacity. It is strengthened by rehearsal processes and lasts long enough to provide information for subsequent responding. From the short-term memory stage information is transferred into long-term memory.

Within the context of this framework it is of interest to know to what extent dyslexics and normals differ in these stages of visual information processing. While the concept of dyslexia is often used loosely, it may be defined rigorously in terms of the difficulty in interpretation of written symbols by people of otherwise average or above average intelligence (Keeney, 1971). Such a group should be free from organic disorders and not suffer from general intellectual impairment.

The present study was designed to examine differences in the performance of dyslexic and normal children in the recall of letter arrays which were presented for varying durations. With very brief exposure performance is dependent primarily on the iconic stage, while with increasing duration it is possible for subjects to encode information into later stages before the display is turned off.

METHOD

The Sample

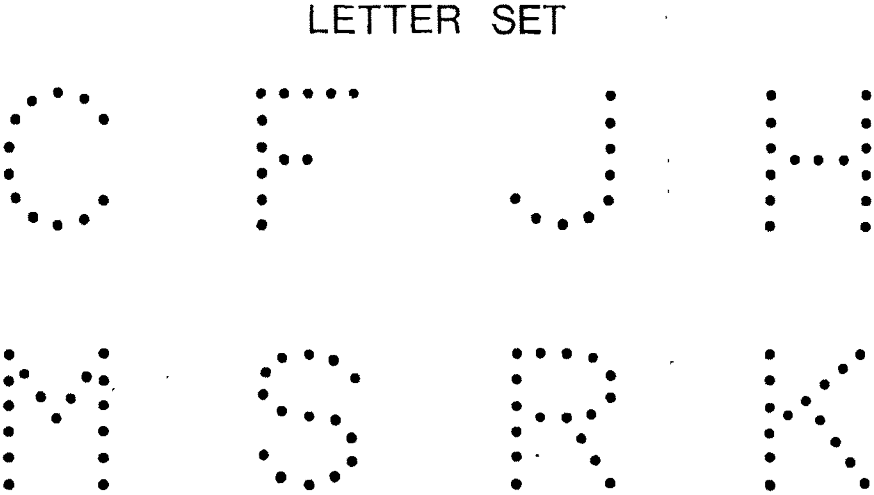
A sample of 66 children was recruited from four inner suburban primary schools in the Melbourne area. Each of these four schools had a remedial teacher and the selection of the 33 pupils in the dyslexic group was made in consultation with the remedial teachers. The criteria used were (i) specific reading disability of 2·5 years below normal; (ii) performance at average or better levels in other subjects; (iii) absence of gross behavioural problems; (iv) absence of organic disorders. The 33 control pupils were selected by their class teachers as being average to bright students. The subjects were chosen in an age range of 8 to 12 years, the dyslexic group having a mean of 10·88 ± 1·27 and the control group 10·52 ± 1·28. There were 21 males in the dyslexic group and 17 in the control group.

Apparatus

The apparatus consisted of an Hewlett-Packard cathode ray oscilloscope (CRO) which was under the control of a PDP 11/20 computer. The CRO had a P15 phosphor which fades to 1 per cent relative brightness 10 microsec, after intensification ceases, effectively eliminating phosphor persistence artefacts. Four six-letter arrays (H J R M K S, C F H J K M, M F S R J H and K S H J F M) made up from the letter set depicted in Figure 1 were displayed randomly. The children sat at a distance of approximately 370 mm from the CRO and the stimuli were 30 mm in height.

FIGURE 1

THE LETTER SET.



Procedure

The children were tested individually, and prior to testing were required to identify correctly all letters of the alphabet, which were displayed for long durations on the CRO. After this they were informed that they would be shown an array of letters and that their task was to recall as many letters as they could, with the order of recall being unimportant. Complete responses were recorded on each trial and the subjects were not told that only consonants would be in the array and that only four different arrays would be used. The four six-letter displays were presented, one display at a time, in random order. Exposure for the first display was 40 msec. and subsequent presentations of the other arrays were incremented in duration to 100, 200, 300, 500, 1000, 3000 and 6000 msec.

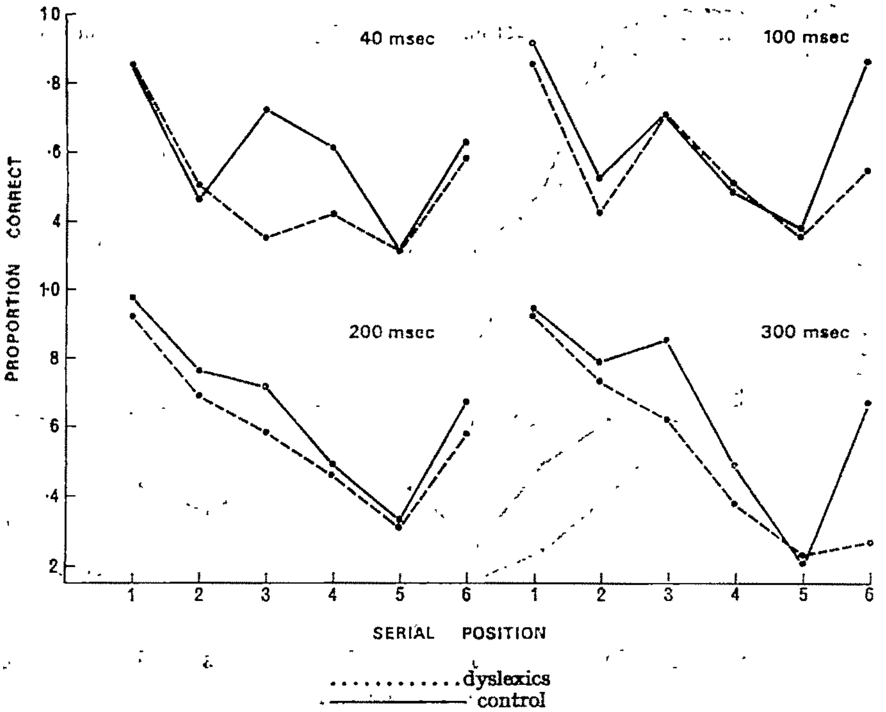
RESULTS

The mean proportion correct responses for each serial position of the six letters for each group of children was plotted for each exposure duration as shown in Figures 2 and 3. The following trends are visible : (i) in general the functions for the two groups are remarkably similar in shape ; (ii) with the exception of the 40 msec condition, the difference between the two groups is small in magnitude at the shorter durations, and with increasing duration there is a tendency for greater difference between the two groups ; (iii) there is a clear position effect and with longer duration performance improves in serial order from the left hand side.

The data were analysed statistically using a multivariate analysis of variance technique. A $2 \times 6 \times 8$ complete factorial design with the factors group (dyslexic, control), serial position (1, 2 . . . 6) and time of presentation (40 msec, . . . 6000 msec.) with one observation in each cell was used, the triple interaction being used to estimate the residual sum of squares. The respective F ratios for these three main variables were $F(1, 35) = 42{\cdot}15$, $F(5, 35) = 102{\cdot}18$ and $F(7, 35) = 20{\cdot}79$, all of which are significant at $P < {\cdot}001$. The group × time interaction ($F\ (7, 35) = 1{\cdot}93$, $P > {\cdot}05$) was not significant, but the group × serial position ($F\ (5, 35) = 4{\cdot}23$, $P < {\cdot}01$) and the serial position × time ($F\ (35, 35) = 5{\cdot}70$, $P < {\cdot}001$) interactions were significant. The group × serial position interaction is probably mainly due to the 40 msec condition as for longer durations the serial position functions are fairly similar for both groups. The serial position × time interaction reflects the tendency for the items to be learned first from the left-hand side of the array.

FIGURE 2

PROPORTION CORRECT RESPONSES FOR EACH SERIAL POSITION FOR EXPOSURE DURATIONS FROM 40 TO 300 MSEC.



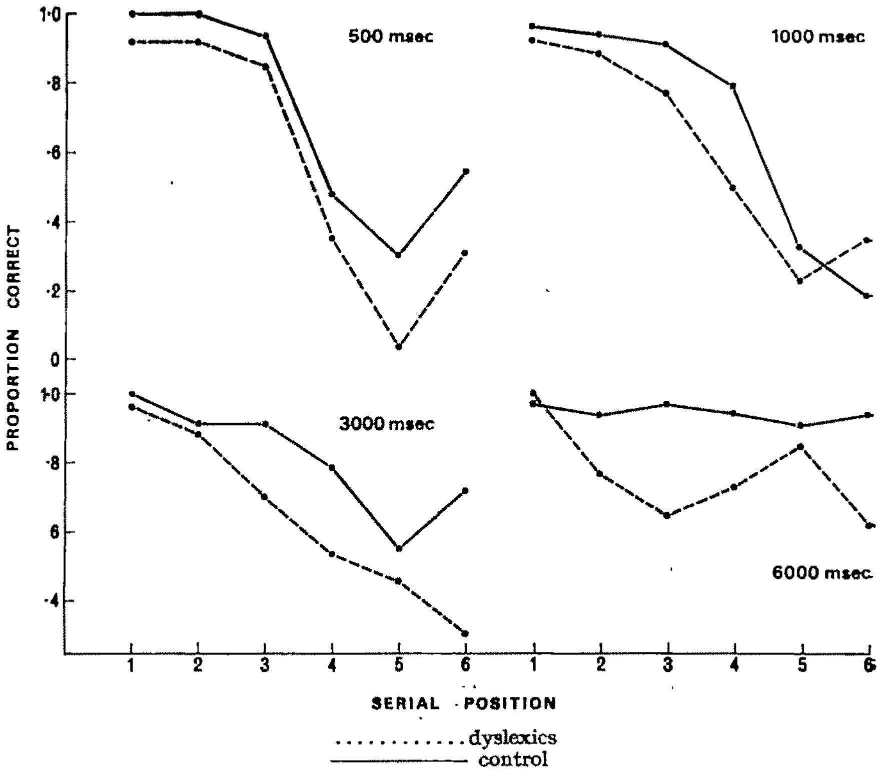
DISCUSSION

At the briefest exposure duration (40 msec.) recall of information is dependent primarily on iconic storage. There is no opportunity for more than one letter to be processed into short-term memory before stimulation ceases (Cavanaugh, 1972) The differences between the dyslexics and normals at the 40 msec. exposure presumably reflects differences in the effectiveness of retrieval from the visual information store. Supportive evidence for this inference comes from Stanley and Hall (1973) who found differences in transfer rate between the two groups when a masking paradigm was used.

Exposures longer than 40 msec. allow the operation of rehearsal and transfer into short-term storage while the stimulus is still present. The general similarity of the later curves depicted in Figures 2 and 3 suggests that the differences between dyslexics and normals represent differences of level rather than differences in kind of visual information processing. Lest the reader interpret this result as simply due to general differences between the two groups in level of cognitive functioning, reference must be made again to the criteria on which the sample of dyslexics was chosen. It will be recalled that they were chosen because they had a specific deficit in the area of reading, but were average or better in other areas. Stanley and Kaplan (1973) found the same group of dyslexic children to be equal to the controls on a number of other perceptual–cognitive tasks not involving short-term memory. The findings that the dyslexic sample differ only in level of performance supports the notion of a developmental lag in visual memory, without any other fundamentally different processes being involved.

FIGURE 3

Proportion Correct Responses for each Serial Position for Exposure Durations from 500 to 6000 msec.



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(Manuscript received 23 *March*, 1973)

PREDICTION AND IMPROVEMENT OF ACADEMIC PERFORMANCE IN A DEVELOPING COUNTRY

By D. W. BETHLEHEM
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SUMMARY. Zambian students filled in questionnaires developed in Britain measuring efficiency of study methods and motivation, and an experimental group received tutoring in how to study efficiently. The scales proved reliable. The scores of Zambian students were significantly higher than those of a British sample. Scores on both the study methods and the motivation scales correlated significantly more highly with grades in Zambia than they did in Britain, despite the restricted range of results in many courses. The special tutoring in study methods resulted in significantly higher grades for second year students compared with a similar control group which did not receive such tutoring.

INTRODUCTION

The University of Zambia admits students with O-levels. All students enter either the School of Humanities and Social Sciences or the School of Natural Sciences. In the former they may proceed to majors in a variety of fields, including business administration and public administration, or into the School of Law or the School of Education. All these degrees normally take four years. Students normally do four courses (or eight half-courses) per year, each one of which is examined at the end of the year. Marks are assigned on a nine-point scale. The course system means that a student might be doing first, second, third and fourth year courses simultaneously. Students entering the School of Natural Sciences may proceed to a major in a science subject after four years, or to a degree in medicine, engineering or agriculture, which take longer. The School of Natural Sciences requires science and mathematics O-level passes. Because of these requirements, it is more difficult to gain admission to natural sciences than to humanities. The lack of competition for entry combined, perhaps, with the relatively poor schooling which many of the students have received, means that many students cannot cope with university work and have to be asked to leave after one or two years. This high rate of wastage causes concern in the university. This paper reports an attempt to reduce the wastage which may be applicable to institutions of higher education in other countries, and reports the application in Zambia of scales for the prediction of academic performance which were developed in Britain.

Entwistle and his colleagues (Entwistle and Entwistle, 1970 ; Entwistle *et al.*, 1971 ; Entwistle and Wilson, 1970) have developed scales for measuring efficiency of study method, motivation, and other factors which are less applicable in the Zambian situation. The scales, like similar scales in America (see Lavin, 1967) correlate positively with academic performance. It is reasonable to suppose that efficiency of study method and motivation are more powerful factors in academic performance in Zambia than they are in British universities. Students who get to universities in Britain have two or more years of A-level study behind them which helps train them in study method, whereas Zambian students come direct from fifth forms in which regimented methods of teaching are common and pupils have less opportunity of acquiring the skills associated with studying on one's own. Again, it is only the more highly motivated persons who get to university in Britain, whereas it is a common observation that some students in Zambia are not highly motivated.

It seemed reasonable to hope, then, that scales measuring SM (efficiency of study method) and MOT (motivation) would correlate more highly with academic performance in Zambia than in Britain, and that it might be possible to raise the efficiency of students' study methods, and possibly increase motivation, by teaching students how to work effectively.

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METHOD

Two successive introductory psychology classes, and one African studies class completed questionnaires measuring SM and MOT. The questions were taken directly from the papers of Entwistle and his colleagues, and from an earlier version kindly sent to the author by Professor N. J. Entwistle and Dr. J. D. Wilson. They also completed other questionnaires including a dichotomous self-rating on introversion–extraversion, and stated what they would like to major in. Since all students are required to do African studies in first or second year, this class is very large, and the number of questionnaires on which most results are based is 577. One introductory psychology class filled in the SM and MOT questionnaires twice, to assess reliability.

The first introductory psychology class had been divided at the beginning of the year into eight seminar groups. In the last quarter of the year (it was impossible for a variety of reasons to begin earlier) four of these groups were given six special seminars, each on study method. As well as discussing queries raised by individual students, these seminars involved practice in making notes on a booklet giving " Some hints for students new to the university," and discussion of such topics as the importance of a personal timetable when swotting for examinations, note-taking when reading and during lectures, examination technique, essay-writing technique, effective use of the library and so on. Guinery (1967) was used as a kind of textbook for these seminars.

RESULTS

Extraversion

The attempt to measure extraversion by self-report failed. 341 students considered themselves introverted, against 137 who said they were extraverts. This result is intuitively unlikely. Further, a significantly higher proportion of students who were subsequently forced to leave the university as a result of obtaining poor grades, considered themselves introverted than students obtaining very high average grades ($\chi^2=5{\cdot}31$, df=1, $P<{\cdot}05$). In view of the consistent finding of a relationship between introversion and good academic performance (see, e g., Entwistle and Wilson, 1970 ; Entwistle and Entwistle, 1970 ; Lavin, 1967), the self-assessments of introversion by these poor students is very unlikely to be veridical, and probably reflects the action of a social desirability motive.

Questionnaires.

Scores on SM and MOT were normally distributed. The test-retest reliability with a one- to two-week interval (N=45) were ·743 for SM, ·767 for MOT, and ·804 for the combined SM and MOT (i.e., the whole questionnaire) SM and MOT are not, as one might expect, independent—they correlate to the extent of ·536 (N=577).

The mean probability of answering a question in the keyed direction (' correctly ') in the Zambian sample was 0·70 for SM and 0·72 for MOT. Reworking the figures presented by Entwistle *et al.* (1971) yields corresponding probabilities for British university students of 0·49 and 0·59 The differences between these probabilities for the Zambian and British samples are significant. As it seems very unlikely that Zambian students do, in fact, work more efficiently, or are, in fact, more highly motivated than British students, the result is presumably due to the operation of the social desirability motive in Zambian students.

Correlations between questionnaire scores and average grades were significant and encouragingly high (see Table 1).

These correlations are significantly higher than the correlations between these questionnaires and marks in universities and colleges of education in Britain (P= ·039, ·012 and ·04, respectively, for differences between the above correlations and mean correlations reported by Entwistle *et al.*, 1971).

TABLE 1

CORRELATIONS BETWEEN QUESTIONNAIRE MEASURE AND AVERAGE GRADE. N=577.

Questionnaire measure	Correlation Coefficient	Ratio of correlation coefficient to its standard error	P less than
SM	+·285	6·785	·001
MOT	+·323	7·691	·001
Combined SM plus MOT	+·347	8·262	·001

There was no difference on either SM or MOT between students in the School of Natural Sciences and those in the School of Humanities and Social Sciences. (*z* in both cases was less than 1.) Neither was any difference found when analyses of variance were performed on the questionnaire measures between students who hoped to do degrees in public administration, medicine, law, engineering, education or business administration ($F<1$ in both cases). A sex difference did, however, emerge, with men scoring very slightly higher than women on both questionnaire measures ($z=2{\cdot}672$, $P\simeq{\cdot}008$, two-tail, and $z=2{\cdot}052$, $P\simeq{\cdot}04$, two-tail, for SM and MOT, respectively).

The Seminars on Working Method.

An analysis of variance was carried out to compare average grades between members of the introductory psychology class, divided into six groups based on (i) whether they had attended the seminars on working method or not; (ii) whether they were doing noticeably poorly at mid-year or not (a variable which need not concern us here and applied to first year students only); and (iii) whether they were in their first year or in their second, third or fourth year at the university. The analysis shows that average grade differs between these groups ($F=2{\cdot}445$, df=45 and 88, $P<{\cdot}05$.) Further analysis indicates an interaction between year at university and effect of the special seminars: the seminars did not significantly benefit first year students, but grades of second, third and fourth year students who attended the special seminars were just about significantly higher than grades of those upper year students who did not ($t=1{\cdot}92$; df=88, $P={\cdot}056$ by a two-tail test). This difference holds for both first and for second, third and fourth year courses.

DISCUSSION

The failure to obtain usable results with the self-report measure of extraversion is disappointing. It is of some value, however, in that, together with the high SM and MOT scores, it does point the importance of controlling for social desirability in personality questionnaires in Zambia, and this social desirability effect may be a particularly potent factor in other developing countries, too.

On the other hand, the results of the questionnaires are very encouraging. The questionnaires, taken without modification from the British research, proved both reliable and predictive of academic performance. As it is, they correlate more highly with academic performance in Zambia than in Britain, and the correlations reported here would have been raised if they had been corrected for attenuation, and if the grades in different courses had been placed on a common scale, as was done in Britain. Many courses in the University of Zamiba produce distributions of results which are of very narrow range. These questionnaires may prove of value in identifying weak students who have poor study methods and/or low motivation for special attention. Since they work so well in Zambia in a quite unmodified form, they would doubtless work in other countries outside Britain as well.

No differences emerged between students intending to take up different areas of study, or in the different schools, whereas there are hints of such differences in Britain (Entwistle, 1972). If there is a difference between students in different areas of study later, then it is a result of, or emerges during, the study itself. This conclusion may not apply in Britain as choice of area of study probably has very different determinants in Zambia from the determinants in Britain.

The results of the special seminars in working method are encouraging. It is not clear why they did not objectively benefit first year students, while they did benefit higher level students. It was clear that students of all years felt subjectively that they were of value—indeed, some students from the control group tried to gain access to the special seminars. Perhaps students need to reach a take-off point as a result of experience in the university environment before they are able to take advantage of the suggestions provided in such seminars. Whatever the reason for the absence of a difference among first year students, the difference among second year students is notable. This difference was achieved in the face of the disadvantages occasioned by the constriction in range of grades in many courses, and the fact that the seminars could not be given until the last part of the academic year. These results suggest that seminars of a similar kind in working method might benefit students in institutions of higher education in countries besides Zambia, developing and developed.

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BOOK REVIEWS

BRUNER, J. S. (1972). *The Relevance of Education.* London: George Allen and Unwin, pp. 175, £2·50.

There is a current and welcome trend for leading psychologists to reflect and comment on the broader implications of their subject as a change from the more rigorous pursuit of analytical experimentation. In this short volume, Bruner penetrates deeply into significant contemporary educational issues which have arisen from his more recent study of the early years of a child's development and the transmission of culture in contrasting social environments

It is essential to read the preface first and to overview the book as a whole, for it is an edited collection of essays and papers published, as he puts it, between 1964 and 1972, years of deep and tumultuous change, disturbing years. This accounts for some repetition of key themes and ideas, and on a first reading an apparent lack of continuity between chapters. Bruner demands far more than minor revisions of the curriculum, but a restructuring of the whole educational system: " Education has failed to respond to changing social needs—lagging behind rather than leading."

His work on the structure of knowledge is less well known in this country than his research into the selection of strategies in problem solving. His thesis is that knowledge not merely mirrors but predicts how the world will be or might be through a process of extrapolation.

How does a school make knowledge accessible to the child? Bruner outlines some possible theoretical solutions, but in leaving their implementation to the teacher without a detailed illustrative working model he is not being particularly helpful. His well known assertions " that any subject can be taught to anybody at any age in some form that is both interesting and honest," and that " knowledge is to be converted into a form capable of being mastered by a beginner as it is less a matter of stunted abilities than failure to understand how to teach certain subjects," sound plausible in theory, but in practice, despite masses of research and experimentation, only very limited progress has been made in the methodology of subjects like mathematics and science.

Few would disagree with his view that in a world of expanding knowledge, the child must be saved from needless learning by some form of economy. The explosion of knowledge needs to be accompanied by some forms of implosion, namely, the integration and connection of knowledge by powerful theories. He makes a valuable point that data retrieval and other systems of storage could impair the production of such theories if knowledge becomes too codified.

Human capacity is limited at any given moment for dealing with information; therefore, how should one utilise the artificial supplements made available to man through modern technology? The learner must adopt strategies, he must have access to sequential patterns for handling complex data and he must have greater understanding of the nature of pre-requisite learning.

Bruner is an undisputed authority on the psychology of problem solving and naturally on this subject he is most convincing. A variety of problem solving situations need to be explored and the child asked what *might* have occurred rather than what *did* occur. How true is his observation that in class children often waste time figuring out what the teacher wants and in what way it must be done!

On teacher training he makes two interesting proposals; one is an argument for the abolition of separate departments of education as the entire university community must have a role in education; secondly, the student teacher should be given training in the skills of dialogue—how to discuss a subject with a beginner.

In the final chapter, poverty and childhood, he turns to the plight of the disadvantaged, particularly in the early years of child development. He maintains that change and reform must come from within the poor community itself and can not be wholly imposed.

In retrospect the book recalls A. N. Whitehead's classic in a contemporary setting and with greater social and psychological content. Readers not conversant with current developments in educational theory will find some technical sections difficult to read but generally it should prove rewarding, especially for discussion purposes.

GORDON R. CROSS.

CRONBACH, L. J., GLESER, G. C., NANDA, H., and RAJARATNAM, N. (1972). *The Dependability of Behavioral Measurements : Theory of Generalizability for Scores and Profiles.* New York : John Wiley and Sons, Inc., pp. xix+ 410, £5·50.

This book is the culmination of 10 years of development work by Cronbach and his collaborators in the area of multifacet analysis of error. The starting point for the book is the unsatisfactory nature of traditional methods of estimating test reliability. The reliability coefficient for a test is by no means unique, and the nature as well as the magnitude of the error variance depends on the particular procedure which has been used in obtaining the estimate. The multifacet approach recognises that in any situation in which measures of behaviour are obtained it will be possible to distinguish a number of sources of random error. A *G* (or generalizability) study uses analysis of variance to obtain estimates of the several variance components of the error. *D* (or decision) studies are designed in the light of the results obtained from the corresponding *G* study, and the traditional reliability coefficient is replaced by a ' coefficient of generalizability.' A number of designs for both *G* and *D* studies are presented together with the appropriate computational procedures. Later chapters provide illustrative examples with numerical data worked through. Interpretations of the results are offered and discussed in some detail.

The term ' universe score ' is introduced as an alternative to the traditional ' true score ' on the grounds that the latter term is misleading; there is no unique ' true score ' corresponding to a particular ' observed score ' since one may choose to generalise in one of several different ways. The premise is, of course, true, but even the tyro is unlikely to confuse an ' estimated true score ' with what the authors call ' in-the-eye-of God reality.'

Two chapters are devoted to the extension of multifacet analysis to multivariate data. The most interesting aspect of this is perhaps the use of all the data in a profile of scores to estimate, through multiple regression, the universe (i.e., true) score on any one of the variables.

The book is presented in the format of a textbook, each chapter being followed by a set of exercises with answers. The authors claim, however, that the volume is a theoretical monograph rather than a textbook. The fundamental principles are clearly expounded, but the inter-collation of practical procedures with theoretical discussion tends to make the more esoteric parts of the argument rather obscure. Indeed, the authors concede that " the book is complexly organised and by no means simple to follow."

The book does, nevertheless, make an important contribution to the field of measurement theory and is likely to be used as a reference work by researchers and graduate students. Its influence on day-to-day measurement procedures, in what the authors would describe as *D* situations, is unlikely to be very great for some time to come.

J. W. STARR.

DODWELL, P. C. (Ed.) (1972). *New Horizons in Psychology* 2. London: Penguin, pp. 287, 75p.

This is the second volume of what is now proposed as a series to appear at three-yearly intervals. The first volume (Ed. Brian Foss, 1966), offered some 40 articles, each outlining the stage of development in a chosen area of psychology; succeeding volumes are to be cumulative rather than to provide revisions, unless major developments requiring important re-statements occur in some area. The contributions to the present volume are grouped in four sections—basic learning and memory processes; motivation; developmental psychology; social behaviour. The book is intended for the student who has already some knowledge of psychology, for the specialist interested in knowing about other fields, and for the general reader. Thus, the appeal of the various chapters will depend on the reader's background, but each article does afford a comprehensive survey of the present state of knowledge in its area, critical comment on what is reported and a good reference list.

The earlier chapters on learning (W. K. Estes), memory (A. D. Baddeley), visual information-processing (M. Coltheart), and mathematical psychology (J. Green) will perhaps prove the hardest going for the general reader who may be discouraged to find here and elsewhere in the book that a summary of opposing hypotheses and related research comes to the conclusion that neither hypothesis is proved—this is the kind of discussion which the scholar can tolerate and enjoy but which grieves the layman in search of an answer—but even the more recondite studies do convey something of the specialist's enthusiasm and may provide unexpectedly fascinating philosophical problems as e.g., how "having information about the meaning or pronunciation of an item is a state which can occur prior to being able to report the item, and even in the absence of being able to report it." It is pleasing to find in the article on the cognitive psychology of motivation (H. Heckhausen, B. Weiner) that 'psychology is regaining its mind' and various contemporary therapies are well outlined by B. Maher ('Experimental Psychopathology'). The choice of articles for developmental psychology may seem a bit arbitrary—'Impact of Piaget on Psychology in the Seventies' (G. S. Halford) and 'Seven Questions about Language Development' (D. I. Slobin)—but they do give very fair summaries and comments. In the social behaviour section, W. J. McGuire provides *en passant* a spirited discussion of the ethics of research in social psychology and P. B. Smith illuminates especially the Machiavellian personality.

It is appropriate in a book of this kind that the majority of references come from publications of the 1960s and 1970s, but possibly less to be expected, if we are really making a tour of the horizon, is that the limits seem to be set almost exclusively by British and American publications: D. E. Berlyne's highly interesting article on 'Experimental Aesthetics' provides a noteworthy exception by including references to French and German publications; perhaps the next volume will see more internationalism. In general, the book achieves a surprising amount of coherence, mainly by its authors' consistent use of thorough and critical reviewing. The final chapter on 'Social Attraction in Animals' (B. Latané, D. Hothersall) may at first seem somewhat out of context, but it proves a stimulating conclusion, not least in its information that "rats don't care how their partners look, feel or smell, as long as they know how to play." It's a new view of the rat-race and though the authors are careful to point out that these findings apply only to the laboratory rat, they could perhaps open an entirely new horizon for human psychology.

MARGARET B. SUTHERLAND.

EISSLER, R. S., FREUD, A., KRIS, M., LUSTMAN, S. L., and SOLNIT, A. J. (Eds.) (1972). *The Psychoanalytic Study of the Child, Vol. XXVI.* London: The Hogarth Press, pp. 616, £5.

This new volume of the psychoanalytic study of the child is divided as in preceding numbers into four sections: contributions to psychoanalytic theory; aspects of normal and pathological development; clinical contributions; applied psychoanalysis.

The five papers on theory begin with a paper by David Beres on 'Ego Autonomy and Ego Pathology' which clarifies the concept of ego as used in psychoanalysis, including detailed consideration of Heinz Hartmann's 'Ego Psychology and the Problem of Adaptation.' Beres points out that autonomy is not "independence *from*" whether it be "from the id" or "from the environment." He sees the aim of psychoanalysis as that of helping each ego function (e.g., judgment, memory, thinking, control of drives) "to perform optionally its role in coping with conflict and promoting adaptation." This paper with its clear, direct style will interest not only analysts. (He himself recognises the importance also of the non-analytic approach to the problem of conscious choice.)

The second paper ("Death Drive, Ambivalence and Narcissism" by Eissler) argues for Freud's theory of a death drive. It is not easy to read, apart from the vivid pessimism of the concluding section, 'Collective Aggression and the Present' where Eissler maintains with Freud that "the development of man's civilization and culture has rested on human beings who are capable of committing murder."

Clifford Yorke's paper 'Some Suggestions for a Critique of Kleinian Psychology' distinguishes sharply between the Kleinian and classical viewpoints and is interesting to read alongside Anna Freud's genetic and dynamic considerations of the infantile neurosis. Loewald's essay 'On Motivation and Instinct Theory' is on the conservative side, making little concession to modern interest in ego functions, and maintaining that "the essential activity of the psychoanalyst is to interpret," without going beyond that, e.g., to consider the relationship itself as curative (though perhaps he takes this for granted).

In the developmental section there are two papers on the self: Ernest Kafka 'On the Development of the Experience of Mental Self, the Bodily Self, and Self Consciousness'; Marian Tolpin 'On the Beginnings of a Cohesive Self' which deals with Winnicott's concept of transitional objects Sheldon Bach has fascinating notes on 'Some Imaginary Companions,' where he discusses three cases of his experience which confirm the many helpful functions of imaginary companions, e.g., promoting moral development. There is a paper by Samuel Ritvo on developmental and clinical considerations of late adolescence. Although he quotes Erikson he does not follow Erikson's views of developmental crises continuing into old age, but instead takes the more orthodox view that "ideally late adolescence is the time of the last spontaneous developmental consolidation and integration of the personality." Robertson's account of 'Young Children in Separation' will interest many people. It seems impossible to agree with him, however, that the fostered children showed no 'protest.' Intermittent protest is still perceptible in the descriptions by Robertson himself (and more vividly in his films documenting these fostering experiments of himself and his wife) Certainly it does not occur at the beginning, as with children who were not given such good substitute mothering, and is much less. This section includes Part II of the vast Baby Profile, outlined by W. E. Freud (concluding the task described in 1967 and 1968 undertaken by the Well-Baby Research Group of the Hampstead Child Therapy Clinic). There is also an interesting study of a single individual by Eleanor Galenson and Herman Roiphe · 'The Impact of Early Sexual Discovery on Mood, Defensive Organisation and Symbolisation.'

In 'Clinical Contributions' there are two finely written papers on 'Reconstruction in Child Analysis' (one 'Some Thoughts on . . .' by Erna Furman, and one by Hanna Kennedy, 'Problems in . . .'). There is a paper by Selma Fraiberg on 'Separation Crises in Two Blind Children' in which she mentions that there was a special problem because the children being blind could not form a mother image. Why should blind children not form a mother image, however, from the experience of hearing, touch and smell? There is another paper on separation-individuation and its anxieties by Margaret S. Mahler. Both these essays contribute to our awareness of the complexities of separation anxiety. Marjorie Sprince has a paper on the analysis of an adolescent boy whose ongoing pre-oedipal tie to his mother aroused resistance to health. Leo Rangell takes the original step of writing about the contribution of psychoanalysis to ' The Decision-Making Process ' which so far has been the concern mainly of experimentally minded social psychologists.

The applied psychoanalysis section has only two contributions, both more or less within the traditional definition given by Ernest Wolf in his paper ' Saxa Loquuntur ' viz, "Applied Psychoanalysis has addressed itself to the content of a work of art or science, and has concerned itself with uncovering latent psychological meanings hidden by the manifest content." The focus of Wolf's paper, however, is on Freud as a writer of prose, exemplified by his lecture ' The Aetiology of Hysteria,' i.e., Wolf is concerned with studying the style in which Freud's essay was written, although in doing so he necessarily considers the content also. The other of these two creative papers is a study by Robert Armstrong of the stories of Joseph Conrad related to his life, with the sub-title ' The Conflict of Command.'

The volume has a 25-page index, and a list of the contents of volumes 1-25.

One of the editors, Dr. S. L. Lustman, died in an accident in August, 1971. His colleagues plan to commemorate his scientific contributions in Volume 27.

RUTH PICKFORD.

ENTWISTLE, N. J., and NISBET, J. D. (1972). *Educational Research in Action.* London: University of London Press, pp. 342, cloth £3·60, paper £1·95.

This volume complements the earlier publication of the authors, *Educational Research Methods*. It is provided as a means of illustrating many of the points made in the earlier work through the presentation of substantial extracts from many real and recent researches. These readings from the literature are introduced by and interspersed with comments from the authors so that the reader may know which are the principal points which are being illuminated and with what degree of success. The whole falls into two parts, one illustrative of general principles and the other more of specific matters. In fact each chapter is so good an example of many general problems that this division is somewhat artificial, but this is of no great moment.

The quotations and readings are almost entirely culled from British sources and this is not only a welcome change from the heavy dependence on American work but also surprisingly revealing of the amount and strength of British research in education. For this alone the book is highly pleasing.

It should be stressed that the concern of the authors is to provide discussion and examples of research in education rather than research in educational psychology. Though at first blush this distinction might seem somewhat artificial there does emerge, both in type of topic and in style of enquiry, a rather distinctive pattern of educational research which has perhaps not hitherto been so clearly revealed. It is relatively survey rather than experimentally based, of which the authors are well aware, and is often analysed in a straightforward yet perfectly adequate manner without general recourse to sophisticated statistical procedures. We have, perhaps, tended too often to overlook the power of these procedures, sufficient as they often are for the purpose in hand.

The book, then, is admirable in its orientation, in its selection of researches and in its shrewd editorial comment. This is a book for one's shelves but even more an essential working book for all advanced students and it is good to see it published simultaneously in both hard and soft covers. It is highly recommended.

G. E. R. BURROUGHS.

GAUDRY, E., and SPIELBERGER, C. D. (1971). *Anxiety and Educational Achievement.* Sydney: John Wiley and Sons, pp. 174, cloth £2·50, paper £1·65.

Like its sister publication, *Personality and Educational Achievement*, the book is in two parts. Part one consists of an 80-page review of research on anxiety, and part two contains 11 readings, designed to facilitate reference to some of the studies mentioned in part one.

The major aim of the book is to examine the relationship between anxiety and school attainment. The text is based on empirical research rather than speculative opinion, and most inferences are drawn from experimental studies. Since the authors also wish to link these findings to educational settings, they have some explaining to do about the problems of extrapolating the results of simple learning tasks in laboratory settings to complex learning in complex classroom environments. This they do in the introduction, maintaining that despite all the difficulties, such research provides carefully established principles for use in research in educational psychology.

Unfortunately, parts of their review hardly instil confidence in this respect. In chapter 8, for example, the authors attempt to extend Spence's drive theory, to incorporate the intelligence variable. Since task difficulty is one of the most salient variables in this context, the chapter is split into sections dealing with the effects of intelligence and anxiety on simple, moderately difficult and difficult learning tasks. Since it is a crucial variable one might expect that a carefully defined operational definition would be given—but no. A set of five paired associates of the table-chair type is arbitrarily taken as a simple learning task, and a moderately difficult task is conceived of as a set of four paired associates where the association is less obvious. Then, since a laboratory study which had used difficult tasks could not be found, the authors decided " evidence of the relationship between anxiety and college grades will be examined on the assumption that the academic task is relatively difficult for most students." Such research is hardly likely to be accepted as providing " carefully established principles."

There are similar lapses in chapter 6 which examines the inter-relationship of anxiety and ability grouping in schools. Great play is made of the fact that levels of anxiety are higher in lower streams. However, since there is an established negative relationship between intellectual level and anxiety, and since schools stream by intellectual level, this is perhaps not surprising. Nevertheless, none of the studies reviewed attempted to hold ability constant.

The remaining chapters present succint overviews of the instruments commonly used to assess anxiety, the behavioural correlates of the anxious student, anxiety and examinations, and the effect of anxiety on programmed learning. Finally, there is an exposition of Spielberger's own trait-state anxiety theory. This has obvious relevance for educational settings since it postulates changes in level of anxiety dependent on the individual's perception of the situation, and judgment of task. An interesting hypothesis developing out of this is that progressive teaching methods may be wasted on anxious children, who prefer a well-ordered routine. The theory is thus likely to provide a useful base for future research into classroom processes.

The only conclusion to be derived from the review section is that the interrelationships of anxiety and learning are complex, and affected by sex, subject area, intellectual level, type of anxiety measure used, and so on. In the personality and attainment field this is an old, old, story.

The authors are an Australian and an American, respectively, and this is reflected both in the review and in the choice of the 11 readings, all of which emanate from those countries. The Antipodean flavour is slightly the stronger, five of the six studies originating from the University of Melbourne, to which the senior author belongs. This sort of insularity pervades the whole book, so that one is left with the distinct impression that the only theorists in this field are Sarason, Spence and Spielberger.

NEVILLE BENNETT.

JORDAN, D. R. (1972). *Dyslexia in the Classroom.* Ohio: Merrill, pp. 194, £1·40.

Dale R. Jordan's book on dyslexia was written specifically for the teacher, and is based on his own apparent wide experience in the field. His stated purpose, " to give simple, trustworthy guidelines for identifying specific kinds of writing disabilities, then to offer workable suggestions for solving many of these problems in the classroom," is admirably fulfilled.

The first few chapters describe the features of dyslexia as seen in the classroom and at a phenomenological level the distinction is made between the visual and auditory types of dyslexia. Not only are the general natures of dyslexic difficulties described but also included is a check list of concrete behavioural items to help the less experienced teacher to pick out the relevant points. The next few chapters go into details about remedial techniques suitable for the different dyslexic difficulties. Here also the general principles are expanded with a wealth of practical advice and many concrete examples of exercises that can be carried out in the classroom.

The last few chapters add a cautionary note about over-diagnosing dyslexia, and the risk of confusing dyslexia with other similarly presenting disorders. This word of caution certainly bears repeating, and the check lists should *not* be used by the teacher as a hard and fast criterion for diagnosis but only as indicators for further investigation.

Jordan's use of the term ' dyslexia ' covers a wider range of learning disabilities than would be included in this country under the heading ' specific developmental dyslexia,' indeed he even includes dysgraphia as a type of dyslexia, rather than as a separate disorder which may or may not accompany the dyslexia. But for practical purposes the isolation of the particular cognitive areas responsible for any child's reading or spelling difficulties, with its implications for remediation, is very worthwhile, and in this respect this book could well be a boon to many teachers.

E. K. WARRINGTON.

KEEVES, J. P. (1972). *Educational Environment and Student Achievement.* Melbourne: Australian Council for Educational Research, A$8·00.

This book is subtitled "A multivariate study of the contributions of the home, the school and the peer group to change in mathematics and science performance during the first year at secondary school." It gives the results of an enquiry carried out in Canberra, and the 242 pupils who formed the sample were a random sample of the English speaking pupils completing their primary school courses in that area in 1968.

Each of the three environments was considered under three heads: (*a*) structural, e.g., the occupational status of the head of the household; (*b*) attitudinal, e.g., the educational expectations of the peer group; (*c*) process, e.g., emphasis on oral work in the classroom. Information about the home was obtained through visits by the author and his assistants, about the school partly by systematic observation by the author and an assistant, partly by questionnaire, and partly by discussion with the staff. An ingenious method of contacting the peer group and obtaining information from them was devised and used by the author.

The measures used in phase 1, when the pupils were still in the primary school, included tests of arithmetic and mathematics, a test of general ability, tests of basic skills and an attitude questionnaire. Towards the end of their first year in the secondary school the pupils took the criterion tests in mathematics and science, completed a further attitude questionnaire, and responded to questions in a general information booklet.

The measurement of change in a longitudinal study of this kind is fraught with difficulty, and the author devotes three sections in different parts of the report to this problem. He decided in the end to use the techniques of regression analysis, and also used path analysis to estimate the strengths of the linkages among the numerous variables. One consequence of the use of regression analysis is that the reader has to keep in mind that ' gain in achievement ' in this context refers to a change in the ranking of a pupil or group of pupils and not to a change in absolute achievement.

The author found that the structural variables of the home background were not significantly associated with final achievement in mathematics or science, but home attitudes were. The associations with the peer group variables were small and erratic. The relation with classroom variables was more marked, significant variables being the experience and specialised training of the teacher and the interaction between teacher and pupil However, what the path diagrams make very clear is that the major factor associated with final achievement was initial achievement, i.e., performance in the primary school a year earlier.

The author stresses that his findings have been obtained in a non-experimental situation and that they would have to be supported by research of an experimental nature before causal factors could be identified with certainty. He also stresses that they apply to specific subjects studied at one stage of the secondary course in a specific community. A replication of the investigation in an industrial area in Britain might yield different results. Nevertheless, this careful study, well planned and executed, is well worthy of notice by all who are interested in the relation between environment and achievement.

David A. Walker.

Ley, P. (1972). *Quantitative Aspects of Psychological Assessment.* London : Duckworth, pp. 180, cloth £3·25, paper £1·50.

Dr. Ley's text is an introduction to quantitative measurement of individual differences. It begins with a chapter on the use of the summation sign and subsequently discusses the basic statistical concepts of mean, variance and normal distribution. Thus, minimal knowledge on the part of the reader is assumed. These ideas lead to a useful chapter on the presentation of test norms.

The next section of the book deals extensively with a discussion of correlation and regression. Topics covered include partial and multiple correlation and multiple regression analysis. Although some of these topics are relatively advanced, the author lays emphasis on explaining the principles involved rather than just outlining the techniques.

The last chapters deal with reliability, validity, Z tests and assessment of selection procedures. In the discussion of validity F and t statistics appear without adequate explanation, which appears surprising in the light of the introductory chapters. In the last chapter, Bayes theorem is illustrated by two examples which are discussed verbally at great length. However, Bayes theorem is not mentioned in the text and is never formalised. This greatly reduces the value of the chapter.

This last comment is not generally applicable as emphasis is placed in elementary algebraic derivations throughout the book. When this aids understanding it is desirable. However, there may be more such derivations included than necessary. A case in point is the proof that a number of tests, made up of a linear combination of the same true score and an independently distributed error term with constant variance, have the same mean and variance as well as the same correlations with an outside variable. They are also shown to have the same correlation between any pair of themselves. This proof takes up more than six pages. Also, if the stated assumptions of this proof are to be taken literally, they imply that the error term is a constant. The author's attempts to reduce 'symbol shock' by introducing symbols slowly results in higher symbol to text ratio than is normal. This may have the undesired effect of being off-putting to the naive reader and irritating to the sophisticated. Some of the space occupied by elementary algebra might more usefully have been devoted to increasing the number of examples left for the reader.

The text does not set out to be the sole reference work on quantitative aspects of psychological assessment. Indeed, the reader is referred to other sources for multivariate techniques other than multiple regression. Neither can it be regarded as the sole introduction to quantitative techniques for psychologists because it omits discussion of statistical testing and even relevant statistical tables. This being the case, the introductory chapters appear redundant as they will be covered in an elementary statistical text and more space might usefully be devoted to the main topic of assessment.

Despite these criticisms this book covers much material not readily available at this level. A student who conscientiously worked through the book would certainly increase his understanding of statistics relevant to psychological assessment.

RANALD R. MACDONALD.

MELTON, A. W., and MARTIN, E. (Eds.) (1972). *Coding Processes in Human Memory*. Washington, D.C.: V. H. Winston and Sons, pp. xiv+448, £5·45.

The 15 papers which are here presented were prepared in 1971 for an American research workshop by contributors who include Benton Underwood, Michael Posner, Jack Richardson, Gordon Bower, Neal Johnson, W. K. Estes, Delos Wickens, Robert Bjork, W. R. Garner, A. M. Liberman, George Miller and Allen Newell. These authors deal technically with various current researches and the resulting collection will be valued chiefly by psychologists who follow the kind of work reported in the *Journal of Verbal Learning and Verbal Behavior*.

The volume invites comparison with another edited by Melton in 1964 under the title *Categories of Human Learning*. The message of that earlier volume was that laboratory studies needed to pay more attention to the person-in-the-middle and what he is actually doing while he learns and remembers. It is clear from the present volume that this message has been taken to heart and, indeed, the preface talks of a historical Kuhnian paradigm shift as follows: "The traditional association theory, which dealt with associative dispositions between input and output events according to a conditioned-response analogy, has given way to theories in which the learner is conceived to be an active processor of input events and selector of output events, with the products of learning being conceived as stored perceptual or cognitive events and relations between them."

For British psychologists, whose ideas about memory are in the Bartlett mould, this shift is in the right direction. Furthermore, when we recognise the present-day dominance of computer analogies, the shift makes it natural that the 15 papers should have, as their common theme, the idea of 'coding.' The basic idea is that a person builds a body of knowledge or internal scheme of the world around him: when he encounters events, he selects and transforms and elaborates them in accordance with his knowledge, which becomes modified in the process; at recall, he again selects, transforms and elaborates his system of knowledge so as to generate, successfully or unsuccessfully, a semblance of the previously encountered events. In this volume, this basic idea is examined through laboratory experiments which are predominantly about intelligent adults dealing with words or relatively unstructured verbal materials.

One paper, by Fred Attneave, is an exception since it concerns visual-spatial representation. And one other, by Earl Hunt and Tom Love, deserves special notice because it brilliantly exemplifies an approach which, for many reasons, has much to contribute to the advance of psychological understanding. This approach combines the sophistication of experimental ideas and methods with the constraints of clinical inquiry and explores the interacting constellation of capabilities that comprise the strengths and limitations of one person—here, a man called VP who has clearly exceptional memory abilities.

In conclusion, this collection of research papers gives us many good things and perhaps two regrets. One is the absence of a paper attempting to overview the key idea of 'coding.' The other regret is especially relevant to readers of this *Journal*. The preface states: "If this conception of the importance of coding notions is valid, it seems obvious that there must be important consequences for the application of the science of human learning and memory to the control of learning processes in educational settings." But there is virtually no explicit comment on what these educational implications might be.

IAN M. L. HUNTER.

PIAGET, J. (1971). *Biology and Knowledge. An Essay on the Relations between Organic Regulations and Cognitive Processes.* Edinburgh: Edinburgh University Press, pp., 369, £4·00.

This book was published in French in 1967. Piaget's aim is to discuss the problems of intelligence and of knowledge in general and logico-mathematical knowledge in particular, in the light of contemporary biology. The audience to whom the book is addressed is not specifically stated, but it obviously concerns philosophers, biologists, psychologists and mathematicians and, by implication, social and natural scientists in general.

For Piaget the essential starting point is the fact that no form of knowledge, not even perceptual knowledge, constitutes a simple copy of reality, because it always includes a process of assimilation to previous structures. Psychological development always raises biological questions of embryogenesis and of the relations and regulations between the organism and the environment. Life is essentially autoregulation. Furthermore, cognitive functions also are reflections of the essential mechanisms of organic autoregulation. Knowledge does not start in the subject through somatic knowledge or introspection or in the object, since perception itself contains a considerable measure of organisation, but rather in interactions between subject and object and in other interactions originally set off by the spontaneous activity of the organ as much as by external stimuli.

To make effective comparisons between the organisation of cognitive structures and biological organisation, it is necessary, he says, to avoid tendencies which occur naturally to the human mind. One is to project into structures or phenomena of inferior order the characteristics of structures or phenomena of a higher order such as intelligence or intentional consciousness. The other is to reduce the original characteristics of the higher orders to processes of the lower orders, such as reducing intelligent comprehension to the level of conditioned associations and so on. Instead Piaget suggests that the comparisons can be made by using methods of structural and functional isomorphism, by the use of abstract and cybernetic models, by what he suggests calling comparative epistemology and by the epistemology of biological knowledge which implies that the object of an act of knowing is never completely independent of the activities of the subject.

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Jessie Parfit

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He then specifies the meanings of structure and function and proceeds to trace the isomorphisms between the structures of living organisation and cognitive organisation and to the processes of adaptation (assimilation and accommodation), to the conservation of knowledge and its anticipation and to those between organic and cognitive regulations and equilibrations. The essential characteristics of knowledge—understanding and discovery—correspond to organic assimilation and morphological and physiological invention.

But such isomorphisms remain insufficient, he says, unless proof can be provided of the transformation from organic to cognitive structures and functions A way of doing this is by examining levels of behaviour which occupy a middle position between organic life and knowledge. He concludes from this examination that there are three main types of knowledge : (*a*) hereditary and instinctual forms ; (*b*) knowledge gained through experience of the physical world ; and (*c*) logico-mathematical forms Although the latter results indirectly from the splintering off of the second, it is impossible to reduce it to the first.

Finally, he says that the fundamental reality about living things is constituted neither by timeless structures, standing outside history or dominating it like equilibrated organisation forms with permanent conditions, nor by a historical succession of chances or crises like a series of disequilibria without equilibrations. It consists rather of continuous processes of autoregulation implying both disequilibria and a constant equilibration dynamism. Rather more comprehensibly he says that while we may not know exactly what life is, we know still less about the meaning of cognitive truth. If the true is not a copy then it must be an organisation of the real world. But an organisation due to what subject ? One cannot suppose a merely human subject. As a result, he says, all philosophers in search of an absolute have had recourse to some transcendental subject, something on a higher plane than man, much higher than nature and beyond spatial, temporal and physical contingencies. But this transcendental subject has been changing its appearance all the time with no improvements other than those due to the progress of science—the progress of the real model rather than the transcendental one. Since no one can escape nature it must be penetrated gradually by the aid of science. Nature is still very far from having yielded up all her secrets, and before we locate the absolute up in the clouds, it may well be helpful to take a look inside things But the very nature of life is constantly to overtake itself, and if we seek the explanation of rational organisation within the living organisation, including its overtakings, we are attempting to interpret knowledge in terms of its own construction, which is no longer an absurd method since knowledge is essentially construction.

This is hardly an easy book to read and assimilate Attempting to review a book of this depth and scope is a task demanding honesty, compendious scientific knowledge, intelligence and time. At least this reviewer can be honest : given the time, intelligence and knowledge, he might understand it all Perhaps the best summary, though over-modest and somewhat enigmatic, is Piaget's own : " This book has many shortcomings, the principal one being that it proves nothing and that I put forward nothing except possible interpretations based on facts, although constantly going beyond them."

LAWRENCE LITT.

PIAGET, J. (1972). *The Principles of Genetic Epistemology*. London : Routledge and Kegan Paul, pp. 98. £1·50.

This short book is an extension of four lectures given to the philosophy department of Columbia University in 1970. They were published later that year by Columbia University Press under the title *Genetic Epistemology*.

The present book consists of three chapters. The first deals with the formation of knowledge in terms of the familiar stages of sensori-motor, pre-operational, concrete and formal levels of thought. The second deals with the biogenesis of knowledge, that is, the preliminary organic origins of knowledge. The final chapter reconsiders classical epistemological problems.

The first chapter does not merely restate what Piaget has already described elsewhere. There is a new approach to the description of the stages of the development of thought. Rather than a psychological description there is a concentration on those facts that have an epistemological significance. There is also a greater emphasis on the emergence of conscious conceptual and representational awareness from its sensori-motor origins. The chapter also takes account of a large number of unpublished studies on causality.

The second chapter presents the same viewpoint as in *Biology and Knowledge* (Edinburgh University Press, 1971) reviewed above. But whereas the latter is 369 pages long, essentially the same viewpoint is here condensed into 11 pages.

The reconsideration of classical epistemological problems is made in the light of the genetic epistemological viewpoint. This, in Piaget's words, is one which is naturalist without being positivist; that draws attention to the activity of the subject without being idealist; that equally bases itself on the object, which it considers as a limit (therefore existing independently, but never completely reached); and that above all sees knowledge as a continuous construction.

LAWRENCE LITT.

WALL, W. D., and VARMA, V. P. (Eds.) (1972). *Advances in Educational Psychology* 1. London: University of London Press, pp. 189, £3·00.

" Have you looked it up in Vernon ? " is a face-saver which must by now rank high in many pedagogical response-hierarchies. It is good that most contributors to this festschrift for Professor P. E. Vernon should, like the recipient, treat lucidly of difficult topics. But this volume is at once a festschrift and the first of a new series of symposia on educational psychology. The absence of a statement of the editors' views of the nature and scope of educational psychology is therefore regrettable. It seems to this reviewer that studies of individual differences in abilities and aptitudes merit inclusion in this field only if they incorporate or are accompanied by explications of the relevance of their findings to educational processes or educational institutions. (Hearnshaw, to judge from a stringent if over-compressed criticism of the concepts of aptitude and capacity included in this volume, might put the case more strongly). Some papers in this collection give scant or superficial attention to educational implications—a fact which Eysenck disarmingly acknowledges. Stimulating as it is, the book might have better deserved its title had space been found for fuller treatment of pedagogical issues, at the expense, if need be, of the omission of one of the 10 academic papers.

Such strictures do not apply to all contributions. In their masterly review of longitudinal studies, Clarke and Clarke give systematic, if macroscopic, consideration to the modifiability of human characteristics. Wiseman's less demanding survey, ' Environmental handicap and the teacher,' includes comprehensible, if unoriginal, proposals for action. School-based studies of adolescent learning, which owe much to Piagetian theory, are reported by Lovell and by Peel and Da Silva. Of these, the Birmingham studies of verbal comprehension are perhaps the more original, although sometimes, as in Da Silva's work on history texts, apparently lacking in adequate control of lexical and syntactic variables.

Butcher's review of recent work on divergent thinking and 'creativity' is readable if depressing. Activity in this area often seems to the onlooker more like water-treading than forward motion. The wise teacher's concern to help his pupil marry skill-learning with divergent and convergent thinking in non-trivial creative pursuits receives little systematic attention from experimentalists. Chown's paper on cognitive changes in adult life and old age reminds us that *education permanente* is a concept still to be bodied forth in geriatric provision. Eysenck takes the reader at an invigorating pace through the mazes of Spence's drive theory and his own—a paper which deserves re-reading if one is not to overlook such salient details as the size of the undistributed middle between 'introvert' and 'extravert' or 'stable' and 'neurotic.'

For too long the professional education of teachers of physical education, the aesthetic and technical subjects has been over-compartmentalised, and instructional problems in these areas have received less attention than they might in mainstream educational psychology. With the growth of inter-disciplinary studies, these gaps become more painfully obvious. Pickford's paper on colour-vision-defective art students and Kane's review of findings on mental and personality correlates of motor abilities are therefore happy auguries.

This collection certainly deserves a place on the bookshelf of the teacher or advanced student of educational psychology. The beginning student, too, should find some papers of interest, although he may well at times ask himself or his tutors, " What has this to do with education ? "

E. MARGARET MOORE.

WASON, P. C., and JOHNSON-LAIRD, P. N. (1972). *Psychology of Reasoning: Structure and Content.* London : Batsford, pp. 264, £3·50.

This book comes as the culmination of a long series of experiments by the authors and their colleagues. Although a number of the experiments have been separately described in journal articles, this does not detract from the value of this book. Indeed, its real value is in providing a framework showing how the various separate studies are related. And now that it is possible to evaluate the many experiments in the context of this framework, we can see that we are presented with a genuinely original contribution to the psychological literature.

Parts of this book make compulsive reading for the same reason that thrillers do. An initial problem is posed ; there is the search for clues in which the investigators' expertise (knowing what to look for and how to look for it) is revealed ; there are blind alleys to investigate and reject ; there are, inevitably, further problems thrown up ; and eventually there are solutions to the problems. Unlike thrillers, but not unexpectedly, there are still some loose ends left after all the psychological investigations. Unfortunately, this book does not always prove as completely readable as the typical thriller. One reason is that the general approach is a psycho-linguistic one and at least some passing acquaintance with psycholinguistics is desirable, though not essential. A greater problem is that some knowledge of logic is essential. Admittedly the authors do not necessarily expect their readers to be familiar with the propositional calculus, for they do explain, although sometimes rather too succinctly, the logical processes and/or fallacies they are investigating. But they are much too optimistic about their readers' skills : a considerable number of psychologists who do not have any real knowledge of logic and the propositional calculus, will find a great deal that is difficult to follow.

This book falls into two main sections. First, from studies of individuals' reasoning ability, or what they describe as "the psychology of inference," the authors quickly become disenchanted with the propositional calculus as a criterion for logical ability. "Mature deductive powers," they state, "whatever else they may be are not founded upon an implicit grasp of the calculus." Their study then becomes 'psychological' as much as, or possibly rather than, 'logical' and the bulk of this book reports on attempts to describe the extent to which we reason and to delineate those factors which influence how we reason. Second, towards the end of the book, there is a series of chapters devoted to considering the relevance of their findings for some specific real life situations: these deal with scientific thinking, the understanding of regulations, and the pathology of reasoning. While this part of the book is less fundamental, it is quite as interesting and just as important as the earlier part.

One fairly general finding which is supported by quite specific studies may well be of interest to those who might otherwise ignore this book. Piaget's ideas about the usefulness of symbolic logic for describing human thinking are rejected. Wason and Johnson-Laird argue that in some respects Piaget is logically naive. For example, they show that conditional statements couched in normal language would lead to absurd implications if merely considered using the laws of logic Moreover, they are most dubious about the nature of the skills shown in formal operational thinking. "Formal operations are, in fact, only elicited by familiar tasks and are not cognitive skills which can be applied to any problem whatsoever." Implicit is an attack on Piaget's stages: far more valuable they claim, is to consider the particular context in which reasoning does (or does not) take place.

One final comment must be made, and it is by way of criticism. Many of the experiments have been carried out on small numbers of subjects of the order of 20 to 30. Although the experimental designs are generally impeccable, there could be some doubt as to the significance of the results obtained. The authors hardly make any reference to this problem. They certainly do not report fully enough to enable the reader to determine levels of significance for himself. Now the book would become too long and even less readable were any statistical analyses to be included, but the authors might have discussed the appropriateness of normal tests of significance and have given some indication of the use that they made of them.

PETER J. MARTIN.

WEINER, I. B., and ELKIND, D. (1972). *Child Development: A Core Approach.* New York: John Wiley and Sons, pp. 247, £2·75.

In the preface of this book the authors state that they have presented a brief but comprehensive introduction to the basic facts and issues in child development. This they have done admirably in a style that facilitates assimilation of content and understanding of basic concepts.

Various approaches to the study of child development are first presented and are related in subsequent chapters to infancy, the pre-school years, middle childhood, and adolescence. Each of these stages is described in terms of physical and mental growth, personality and social development, individual and group differences, and abnormal development. The reader may study each stage as a unit or abstract a common aspect from each stage, such as the physical, and follow it through developmentally The authors suggest that the book should be read at least twice, once from a topical and once from a developmental standpoint

To keep the text brief the authors describe what is known or believed to be true about children without citing in detail research studies but there is at the end of each chapter suggested readings relating to significant research in the field together with a brief description of each.

They have used the findings and theories from the major approaches to child study in their discussion of child development and adopt an eclectic approach. Thus, the developmental-descriptive data including that of Piaget, social learning theory and the clinical approach are drawn upon in considering normal and abnormal development. Throughout the text they incorporate both critical periods and continuity relating particular behaviours to particular environmental events.

There is consideration of social-class and cultural differences in addition to abstraction of universal patterns common to all children. There is an attempt, too, to describe what is known about parental and teaching practice that facilitates or impedes healthy growth and development of children. The authors state that there are many roads to successful parenting and teaching but that prospective parents and teachers who are seeking their own style of relating to children should benefit from a knowledge of the basic facts and principles presented in their text. They are descriptive rather than prescriptive so that the reader can draw his own conclusions about implications for child-rearing and educational practice.

In the final chapter there is a consideration of implications including a clear statement of the authors' position with regard to child rearing and education. A child is seen by them as a growing, a knowing and a showing organism. As regards growth, they suggest that enrichment of the environment to maximise growth in all aspects is preferable to acceleration of growth in some limited domain to the detriment of growth in other domains. They believe that a child needs to experience the restraints and limits that are necessary when his needs and interests conflict with those of other people and that most successful development involves a child's growing awareness of his freedom and of his constraints. As a knowing organism they see the child as trying, to the best of his ability, to make meaningful his experiences of the world and his place in it. This striving for meaningfulness is for them a central dynamic of personality growth. Also a child is a showing organism, i.e., has need to express himself which, when encouraged, helps successful development of social interaction with adults. They do stress, however, that freedom does not mean licence ; children should not only be listened to but should also learn to listen in return.

In the final paragraph the authors state that " the conception of children as growing, knowing and showing organisms underlies the discussion of child development we have provided. In our view child-rearing and education practices that help parents and teachers look at child behaviour from the standpoint of these basic components will best prepare them to handle the 'troublesome' behaviour of young people with good humour and perspective and will best help children to mature into self-accepting, self-sufficient, and productive adults."

This book, which is lucidly written, converges upon important aspects of child development and presents basic facts and principles which will be helpful to those responsible for child-rearing and teaching. It provides a basis for helping children to develop their human potential and to cope with life. It is a very good introduction to child development and should be particularly interesting and helpful to any person embarking upon a career involving the care of children, such as teaching.

R. HARRIS.

NEW JOURNAL

Education 3-13. Editors: C. RICHARDS, B. ABELL and D. WICKSTEED. Published by Collins, Glasgow, in association with the Primary Schools Research and Development Group, School of Education, University of Birmingham. Twice yearly, subscription 90p (USA $6·00).

The editors' statement of policy in the first issue lists a range of aims: to help teachers in curriculum decisions; to inform on differing views about aims; to examine children's learning styles, attitudes and development; to debate the role of the teacher; and to remedy the neglect of primary education. The theme of the first issue is 'Discovery Learning' with contributions by Clegg, Dearden, Stones, Southgate, Taylor and Reid, and others. The second issue reviews 'Aims in Primary Education,' with an introduction by Lady Plowden. Any attempt to bridge the gap between teacher and research is surely to be welcomed. *Education* 3-13, with its attractive cover and illustrations and its repeated emphasis on the 'practical,' 'realistic' and 'relevant,' appears to be firmly based on the teacher side of this gap.

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